



COAL AGE



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No. 8

"Heat Not a Furnace for Your Foe so Hot that It Do Singe Thyself"

MR. SHAKESPEARE wrote that, and it's pretty good advice. We have just learned of an instance where a "shyster" lawyer suffered a severe singeing in the manner indicated. Sounds too good to be true—does it not?—but it's a fact nevertheless.

A superintendent, who is a friend of ours, received a letter from a certain lawyer reading something like this:—

"John Doe, an employee of your company, was injured at one of your coal mines last week through the negligence of your company and has just gone through a serious operation at the L—— Hospital. I have just entered suit against your company for him. He has \$75.00 due him on your last month's payroll, and I request that you forward that amount to me on Saturday, your regular pay day."

The superintendent investigated and failed to find John Doe on the payroll, and he immediately wrote the lawyer to that effect.

The lawyer replied with:—

"You are evidently mistaken. The following persons witnessed the accident."

Then followed a list of five names.

Imagine the surprise and joy of the superintendent when his timekeeper reported that not one of the names furnished by the attorney had ever appeared on the company's payroll.

He lost no time in again communicating with the attorney and this time he included a few pertinent questions, as a basis for future correspondence.

He hasn't received a reply as yet. However, in a roundabout way, he learned that a certain ignorant, illiterate darkey had succeeded in getting an advance of \$30.00 from the lawyer in question, and the lawyer has not seen fit to prosecute the offender.

The darkey, under another name, had really dug coal at our friend's camp some years before, and thus was able to tell a plausible story to the attorney. He had been slightly injured through his own carelessness while loafing in the city, and had succeeded in gaining admittance to a charity ward of a hospital where the attorney's "ambulance chaser" discovered him.

The case, as described by the darkey, looked good to the attorney, and the \$75.00 of (imaginary) wages due certainly justified a \$30.00 advance. In fact, he had often made advances when the would-be client suggested that he must have money to live on.

For years, we have been trying through laws and appeals to public opinion to make the shyster trade unprofitable, but so far, to our knowledge, not one shyster have we vanquished.

All honor to the darkey for his victory as well as for his suggestion. We will willingly furnish bond to any of his imitators who land in jail.

Ideas and Suggestions

Blocking Worry, Trouble and Expense

BY ALABAMA

Many men who are entrusted with the business of management pin too much faith in reports and spend too much time in perusing and following them up. The more exhaustive they can be made, the better some of these men seem to like them and the more time they spend on them. Minor officials and heads of departments are forced to give too much of their time to formulating these reports and answering letters about them from the men who think they are indispensable. This goes on month after month and grows more vexatious to all concerned. Some of the letters often sting pretty hard because most men about a coal mine carry their mail in their pockets and to read and think about letters of criticism throughout the hours of work does not tend to raise a man's real practical value to the company that employs him.

It is all right to have reports. They are necessary to the management of any concern. But far too many executives have yet to learn that the purpose which they try to accomplish by too many such voluminous documents can be obtained in an easier, simpler way; and at the same time put an effective block in the way of worry, trouble and expense.

You ask "How can it be done?" Here's the answer:

1—Set up a definite schedule of the requirements (daily, weekly or monthly) of your mine. In the case of labor establish a definite quota of men allowed for each occupation and require your timekeeper to advise you at once when the quota for any given occupation is exceeded. For materials used, provide a schedule showing the quantities of all supplies that you want to keep close track of, which it will be allowable to issue daily, weekly or monthly as you say.

2—On the forms used for various reports provide an extra column for showing labor or material used in excess of requirements. This will show at a glance what the mine appears to be using above what your knowledge and experience has shown to be necessary.

Mine executives who adopt this plan will accomplish two very important things. The first is that of establishing a definite standard for labor and materials necessary to operate normally one or a number of plants. The setting up of such standards will require hard study on the part of the management, but when this is once firmly established and lived up to, there is little doubt that it will result in the elimination of certain expense sustained previously.

Another benefit obtained under this plan is that of eliminating the time and trouble involved in scanning and comparing lengthy reports in an effort to dig out the items appearing too big, etc. In this plan the essential thing in connection with the scrutiny of reports will be to watch carefully the columns showing "Excess of Requirements." In fact after the men all along the

line thoroughly understand that anything used in excess of the established schedule requires special approval and complete explanation; they will live pretty close to the line drawn.

The essence of the whole scheme lies in getting away from the practical effects of following the principle that where foremen are allowed to use any number of men or any amount of material, they will usually be able to get by with their explanations; and adopting the better principle that where a definite requirement is set up, men can be taught or made to live up to same.

The plan offers an excellent opportunity for blocking or preventing that waste of money and time which all mine managers are interested in eliminating. It is working on the principle of buying and using only what one needs which nearly always means living within one's means. Men who operate coal mines will certainly be interested in anything which will help to bring this about for them.

Let us hear from any who think the plan is worth trying.

Put Yourself in the Other Fellow's Place

BY M. D. COOPER*

In your office, when a foreigner with a command of only a few English words comes in to try to explain that he believes there is a mistake in his statement of earnings and deductions, it will help some if you put yourself in his place. Try to realize the difficulties of his position. He is probably handicapped not only by his limited knowledge of English, but the chances are that his calculations are incorrect while his statement is right as it stands.

How much better it is then to win his loyalty and respect by reasonable explanations, rather than to send him away grumbling and dissatisfied, perhaps with a shouted command ringing in his ears and consigning him to a tropical region. There are offices at mines where the men in those offices do not know or else fail to remember that they hold their jobs because the diggers they are so ready to chastise are there loading coal. Offices are not very generally kept up at mines where no coal is produced.

In dealing with a man whose position is either higher or lower than your own, bear in mind that his perspective differs from yours. If you are a fireboss and you go to your superintendent for a house for your family, you, of course, regard the question of a house as of very considerable importance. The superintendent, however, is probably making changes in housing every day and therefore your application is just one of the regular incidents of his day's work. Do not be surprised then if he seems to fail to attach as much importance to the matter as you do. On the other hand, if you are the superintendent or any other official, it is well to remember that any state-

*Ellsworth, Penn.

ment of yours, regardless of its importance to you, may loom up large to one of your subordinates. Make your conversation clear and explicit. If you make no promises, you will have none to break.

MANY PRETEND TO MISUNDERSTAND

In the mine you sometimes hear a man say that he does not know what the boss expects him to do on a certain job. Let him put himself in the boss' place, and reason it out. In nine cases out of ten, the apparent failure to understand orders is due to the fact that the thing to be done is a little out of the ordinary or perhaps a little more difficult than usual. The easiest refuge is found in pretending to misunderstand. A successful pit-boss in Pennsylvania makes it a practice to size up a job from the standpoint of the men under him. His men know that he understands them and their work and that he can't be fooled.

In cases of special danger, it is a questionable practice for one in authority to send a man to work in a place where he is unwilling to remain to supervise the work.

Mistakes will always be made. Whether a man be pit-boss or digger, he must realize that the other is sure to make a mistake now and then. But by putting yourself in the other fellow's place, misunderstandings will almost always be avoided. Circumstances will then be found to explain in part at least the reason for mistakes. In any case, it pays to judge a man not on the basis of his separate mistakes, but rather on the relation of those mistakes to the total amount of work or good that he accomplishes, which is the only equitable basis for judgment.

Put yourself in the other fellow's place. It is the surest way to avoid friction and misunderstandings. It promotes respect and good will. Moreover, it pays because it gets the best results without the inevitable loss that always follows in the train of discord of any kind.

A Safety Appliance for Underground Slopes

By WILLIAM McMAHON*

For many years past, we have heard much of the active work going on in and about the mines looking toward the prevention of accidents. It is gratifying to learn that in many cases employers and employees are coöperating in a safety-first campaign. Too much cannot be written about this subject as statistics show that since this movement was actively taken up, the number of accidents has greatly decreased.

A feature which is highly gratifying is the greatly increased number of articles appearing in the technical journals regarding the many safety devices which are being installed in and around the mines. I am sure these articles and the sketches accompanying them will appeal to all those interested in mining, for in nearly every instance someone will be certain to get an idea applicable to the particular case in which he is interested.

The following description is of a safety device which I installed some few years ago at a mine where I was engaged. At this development the coal bed pitched somewhat, and the coal was gotten to the bottom by gravity, the loaded cars coming down the slope pulling the emp-

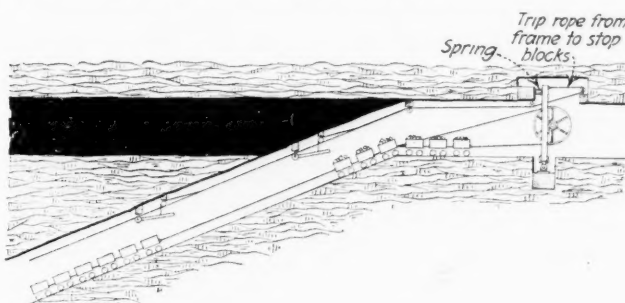
ties up. Many accidents occurred due to loaded cars breaking their couplings at the top of the slope, or sometimes entire loaded trips would be pushed over the knuckle before the rope was firmly attached to them. This not only caused considerable delay and expense, but, what was vastly worse, endangered the lives of the men who were engaged on the slope.

STOP BLOCKS WERE INSTALLED

The frequency of these accidents was considerably decreased by the installation of this device which consisted of a series of stop blocks placed above the loaded track and operated automatically from the pulley frame at the top of the slope. The principle of operation of this device may be clearly understood by reference to the accompanying drawing.

As may be seen in the drawing, the head sheave was carried upon a frame hinged at its lower end and free to move through a limited vertical arc. The trip-rope governing the blocks over the loaded track is attached to the upper end of this swinging frame, passing over a suitably placed pulley so as to receive a reversal of direction before passing down the slope to the trips, or stop blocks.

Whenever a trip of loaded or empty cars, or both, was upon the slope and exerting a pull upon the head sheave,



ARRANGEMENT OF CABLE, TRIP ROPE AND SAFETY BLOCKS

the tilting frame swung to its foremost position, raising the stop blocks thus allowing the loaded trip of cars to pass down the incline. Should a trip break away, however, the pressure on the head sheave would be released, and the stop blocks would have sufficient weight to draw the tilting sheave frame backward, the blocks meanwhile descending and stopping the trip of loaded cars.

It was found in some cases, however, that when a loaded trip had been pushed over the knuckle that the stop blocks were raised to their proper position, but the jerk on the car couplings sometimes caused a breakage in the middle of the trip, releasing three or four cars. The weight of the remainder of the trip was sufficient to hold the stop blocks up out of the way so that the runaway cars could pass down the slope to the landing at the bottom, tying up the entire entry.

The addition of the springs shown in the drawing, when properly adjusted, entirely eliminated this sort of trouble. If, for instance, three or four cars break away when pushed over the knuckle, the springs, although compressed fully by the first shock when relieved of the weight of the cars which broke away, immediately expand, lowering the stop blocks if not to their proper position at least enough to intercept and stop the passage of the runaways.

*Taber, Alberta, Canada.

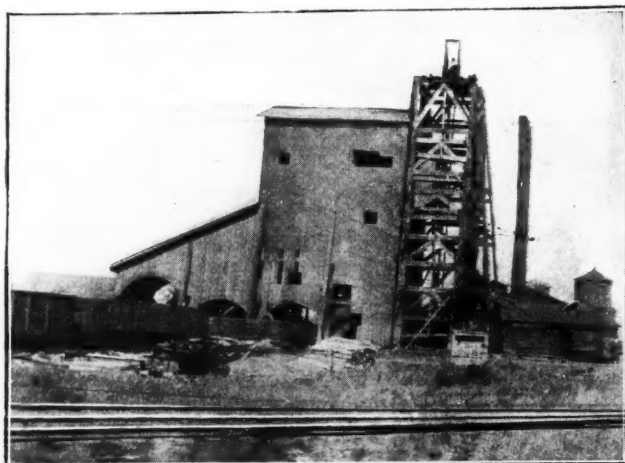
Reopening the Grayson Mine in Illinois

By E. C. LEE*

SYNOPSIS—A dangerous mine fire was extinguished by sealing up the shafts. Rescue corps succeeded in opening up the workings without any serious mishaps. Methods of gas analysis. Permissible explosives adopted.

The No. 6 Mine of the Saline County Coal Co., which was sealed up on Nov. 11, 1914, in order to extinguish a fire in the face of the 1st and 2d West Stub Entries off the 3d and 4th South West, was opened on Dec. 26, 1914, by helmetmen from the Illinois Mine Rescue Stations and from the Saline County Coal Company.

This mine is located on the Louisville & Nashville R.R., at Grayson, about 2½ miles out of Eldorado and was acquired by the Saline County Coal Co. about two years



No. 6 MINE OF SALINE COUNTY COAL CO., GRAYSON, ILL.

ago. The seam worked is the No. 5 of the Illinois Geological Survey Correlation, which in this mine is from 5 to 7 ft. thick. The mining is done by machines of the Morgan-Gardner type, and the coal is shot down by the use of black powder. The following is the proximate analysis of coal from this bed in this vicinity, as made by the Illinois Coal-Mining Investigations. The first analysis of the coal is "as received," with total moisture; the second analysis is "dry," or moisture free.¹

No. of Analysis	Mois- ture	Volatile Matter	Fixed Carbon	Ash	Sulphur	B.t.u.	Unit Coal B.t.u.
1	6.75	35.49	48.72	9.04	2.92	12,276	
2	Dry	38.06	52.25	9.09	3.13	13,165	14,812

"The roof of the No. 5 bed in this district is a shale varying from light gray to black, and locally may be laminated and interbedded with bone and stringers of coal for a distance of 3 ft. above the seam. The roof usually contains also many concretions of iron pyrites called 'nigger-heads.' These have more cohesion with the rest of the roof material than do the nigger-heads of the Danville district.

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¹Bulletin 6 of the Illinois Coal-Mining Investigations, page

"The floor is fireclay which in places contains much sand and heaves badly when wet. The bed does not lie as flat as the No. 6, but contains many hills and rolls causing grades as high as 15 per cent. in the entries of some mines. The coal is not pinched out at these hills, but follows their contours with undiminished thickness."²

THE MINE WAS GASSY

The output of No. 6 mine is about 1200 tons per day, about 225 men being employed. No firing of shots is done while the men are at work, shotfirers being employed for this purpose, and firerunners following them to extinguish any fires which may be caused by the shots. Some sections of the workings generate much marsh gas, but soon after the mine was acquired by the Saline County Coal Co., the fan was enlarged and the airways cleaned up so as to produce an adequate supply of air for diluting and removing this gas. The fan is 16 ft. in diameter and of Crawford & McCrimmon type, with 4-ft. blades, producing 100,000 cu.ft. of air per minute at 84 revolutions per minute.

On the night of Nov. 10, the firerunner discovered a fire in the face of the 2d West off the 4th South West, and, after attempting to extinguish it himself, went out for assistance. The fire was fought by the employees of the mine for several hours, when it was discovered that the face of the 1st West was also afire, the fire extending back of the inside crosscut. Assistance was sent from the No. 3 mine of the company, at Harrisburg, the men being accompanied by Supt. George W. Morris, Geo. Bagwell, formerly superintendent of the O'Gara Coal Co., John Wunderlick, assistant mine manager, Saline Co. Mine No. 2, and Walter Scott, superintendent of the Benton mine-rescue car, who was in Harrisburg on his vacation.

It was known that the roof at the face was in very bad condition, and it was decided that the proper thing to do was to seal off the two entries and smother the fire. Accordingly, a canvas stopping was built across the 2d West between rooms 8 and 9, so as to shut off from the fire the main ventilating current, which in these entries is ordinarily about 12,000 cu.ft. of air per minute.

The men then went through the door marked "D1" on the map, and began the erection of a stopping on the 1st West between rooms 8 and 9. These two stoppings, with one in the crosscut between rooms 8 and 9, would have sealed off the face of the entries, but as the men were finishing the second stopping, a slight explosion, probably of gas produced by the fire, drove them from the work. A glance at the map will show that, on account of the way in which rooms were broken through to the entries above, the erection of seals enough to cut off the fire area would have been a task calling for weeks of work, rather than a few hours; and, recognizing this fact and being unwilling to have the men work any longer in a dangerous place, Superintendent Morris decided that the only thing left was the sealing up of the entire mine, by

²Bulletin 6 of the Illinois Coal-Mining Investigations, page 10.

closing both the hoisting and the fan shafts. The men were accordingly withdrawn and the shafts sealed at the surface.

HOW THE SHAFTS WERE SEALED

The seals over all the shafts were constructed in the same way, mine rails being first laid across the shaft to provide a foundation for the other material. Across these was laid a single course of 3-in. planks, covered with a double thickness of heavy canvas or brattice cloth. A box was then built around the shaft, extending past its edge 2 ft. on each side, and the entire box filled with sand to a depth of about 2 ft. The box was then braced by packing a wall of clay tightly around the outside.

The fan drift was also sealed, but necessarily in a somewhat different manner. Nearest the shaft was built a wall of ship-lath, faced with wood fiber. Eight inches from this was another wall of boards, the space between being filled with sand. Next to the boards was 10 in. of clay, this being supported by another wall of ship-lath, faced with wood fiber. In order to insure a tight joint, the walls of the fan drift were finally covered with cement.

On Dec. 11, just a month after the shafts had been sealed, I accompanied Engineer H. I. Smith, of the U. S. Bureau of Mines, on a visit to the mine for the purpose of investigating the conditions. Several samples of the gaseous mixture inside the mine were taken, using both vacuum and citrate-of-magnesia bottles. The pneumatic signal tube in the hoisting-engine room was opened, a $\frac{3}{4}$ -in. cap being obtained on a Koehler safety lamp held near the opening. The time of the visit was fortunately during a period when the barometric reading was comparatively low, and the samples were obtained without much difficulty. Samples were taken at both the hoisting and fan shafts, the latter being obtained by unscrewing the pressure gage. Mr. Smith and I a little later ran an analysis of these gases, using for the purpose an Orsat gas analysis cabinet owned by the Illinois Miners' and Mechanics' Institute, finding the following mixture:

Carbon dioxide.....	1.63
Oxygen.....	6.25
Methane.....	11.14
Nitrogen.....	79.10
	98.12

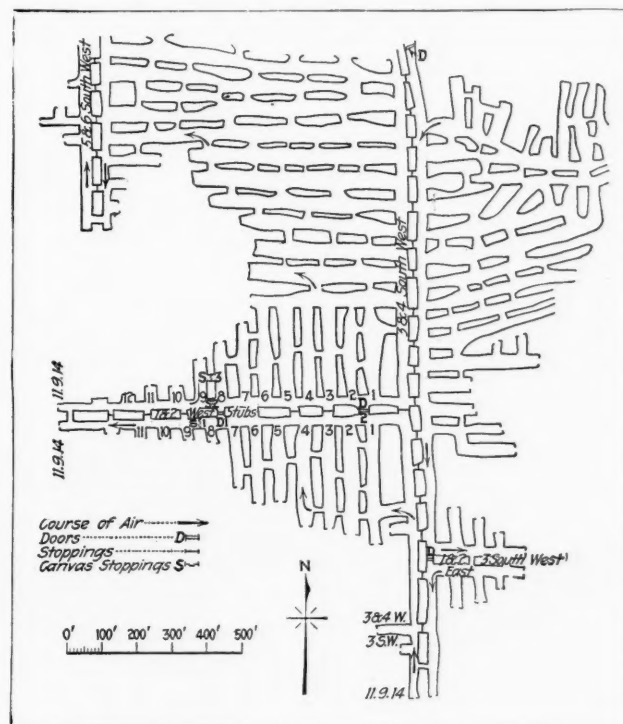
It will be noted that these proportions are not absolutely correct, but they are sufficiently accurate to be used as a guide in determining the condition of the air in the mine. The fact that these results were later checked by the Bureau of Mines leads me to the belief that a description of the simple apparatus used in making the analysis might be of benefit in a paper like this.

METHOD EMPLOYED IN ANALYZING THE GASES

The Orsat belonging to the Miners' and Mechanics' Institute is one made by the Central Scientific Co., and consists of a burette and three pipettes, connected by a train. The burette has a capacity of 100 c.c., and is finely graduated. It is inclosed in a larger tube, which is filled with water, so as to keep the temperature approximately uniform during the analysis. The first pipette contains potassium hydroxide solution, for the removal of the carbon dioxide in the gas; the second contains an alkaline solution of pyrogallie acid, for absorbing the oxygen; and the third is filled with an ammoniacal solution of copper chloride, for the absorption of carbon monoxide.

A second cabinet accompanies this, used for the determination of methane. The pipette in this cabinet contains a small platinum wire, which is connected up to an electric current and heated up, so as to burn the methane. The remaining gas is then run through the first pipette again, and the carbon dioxide formed by the burning of the methane is removed. The sample is then returned to the burette and the contraction in volume due to this absorption of carbon dioxide is recorded. Bulletin 42 of the Bureau of Mines gives an excellent description of this apparatus and the method of operating it.

At the time the samples were taken, readings of some of the charts from the pressure gage were taken. A chart made during the time the fan was in operation showed a



MAP OF THE GRAYSON MINE

minimum reading of 0.9 from 6 p.m. to 7 a.m., and a maximum reading of 1.2 from 9 a.m. to 4:15 p.m. on Oct. 29. The chart made on Dec. 10, the day before the samples were taken, showed the following readings: —0.1 from 7 a.m. to 8:45 a.m.; —0.05 to 2:30 p.m.; 0.0 to 4:15 p.m.; —0.1 to 7:15 p.m.; and 0.0 to 7 a.m. During the time of taking the samples, from 2:45 p.m. to 4:15 p.m. on Dec. 11, the gage varied from 0.3 to —0.2.

After these analyses were run, Superintendent Morris, taking into consideration the experience of other operators in the southern Illinois field, decided to reopen the mine on Dec. 26, and go into the fire area; if the fire was then found to be out, the fan might then be started. Accordingly a request for help was made to the Illinois Mine-Rescue Commission, and Superintendent Towal, of the Benton station, and Superintendent Scott, of the Hermin substation, went to the mine.

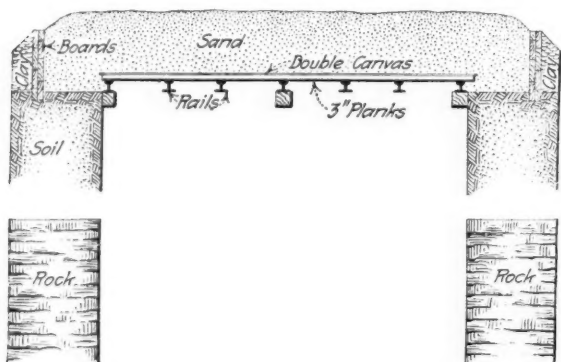
Two types of apparatus were used, the Draeger and the Fleuss, the Draegers being the property of the company, and the Fleuss coming from the rescue stations. During the work some little trouble was experienced with the privately owned apparatus, but in justice to the manufacturers it should be recognized that

the apparatus belonging to a coal company, where there is but little use for them, do not generally receive the same attention that is given to those from the rescue stations.

The work of opening the mine was directed by Superintendent Morris, Mining Engineer Reuben Williams, H. I. Smith of the U. S. Bureau of Mines, James Walker, county inspector of mining, and John Winterbottom, mine manager; to whom each corps reported on their return to the surface and from whom each new corps received definite instructions before entering the mine.

THE SHAFT WAS UNSEALED

The seal was removed from the top of the hoisting shaft at about 11 a.m. Dec. 26. The air shaft was not opened. The first team wearing breathing apparatus entered the mine at 1 p.m. This team consisted of Walter Scott; John Hopkins, assistant mine manager; and Bertram Peak. It should be remembered that when the shafts were sealed, the first stopping had been built, and as the men withdrew, Mr. Scott opened the door just outside the stopping, so as to partially short-circuit the air, if there should be any circulating. The men also opened the door between the air shaft and the hoisting shaft to short-circuit the



METHOD OF SEALING SHAFT

air, in an attempt to establish a base for their operations at the foot of the shaft. It was found, however, that to establish such a base at the shaft bottom would necessitate the construction of several stoppings, and the attempt was therefore abandoned and all operations conducted from the surface. A little trouble was experienced with one of the apparatus, and the party returned to the top, having been under about an hour.

The second party, consisting of James Towal, Walter Scott, John Hopkins, James Pepper and Bertram Peak, entered the mine at 3 p.m., the first three equipped with state apparatus and the other two wearing those belonging to the company. These men explored the haulageway up to the fall on the fire and examined the stoppings and other conditions. They estimated the temperature in the neighborhood of the fall as being 100 deg. F. or greater. This party returned at 4:50 p.m., having worn the apparatus one hour and fifty minutes.

THE AIR SHAFT IS NEXT UNCOVERED

The cover was removed from the top of the air shaft at about 5:30 p.m. Upon the removal of the first board under the canvas, four men were caught in the released gases, and ten more were overcome in trying to rescue them. The fan was started immediately to blow fresh air over them, and at the same time the oxygen apparatus

were sent for. Before the apparatus had been obtained the men had been rescued. They recovered quickly, but that night became very nervous and shook violently. Their sleep was accompanied by horrible dreams. After the men were recovered the fan was stopped, and the seal removed by men wearing oxygen apparatus.

The third party consisted of Scott, Pepper, Peak, Hopkins and Watson, the first three wearing Fleuss and the last two Draegers. They entered the mine at 8 p.m., and returned at 8:40 p.m. because the last two men had trouble with their apparatus. Operations were then suspended until four more rescue apparatuses were obtained from the Benton station. These arrived at about 3 p.m. Sunday, Dec. 27, and the fourth party, consisting of Scott, Watson, Law, Pepper and Peak, entered the mine at 3:30 p.m. They returned at 4:45 p.m., having lost their route and failed to reach the fire area. The temperature on the parting outbye the 4th South West was reported by them as 78 deg. Fahrenheit.

THE FIRE AREA IS REACHED

The fifth party, Towal, Cathcart, Futrell, Biggs and Hopkins, entered the mine at 6:30 p.m. and explored the 4th South West entries and rooms. They selected places for stoppings, dug five holes through the fall, set four props, and returned to the top at 8:10 p.m. The sixth party entered the mine at 9:30 p.m., traveled to the fire area and tightened the fifth prop, nailed on the canvas and carried props into the crosscut in the inside room, returning to the top at 11:10 p.m.

The seventh party, under Towal, entered at 12 midnight, traveled to the fire area, a distance of 2700 ft., set four props, in the crosscut between rooms 8 and 9, put in two side braces, and returned to the top at 1:15. The apparatus used by this party was not fully charged when they started. The eighth party, under Scott, entered at 2:35 a.m. They nailed on the canvas, closed the doors left open to short-circuit the air and returned to the top at 3:30 a.m. The temperature in Room 9 off the 4th South West was 82.5 deg. F. The fan was started at 4:05 a.m., and the men left the mine at 8 a.m., leaving everything in a satisfactory condition.

Because of the size of the fall in the faces of the two entries where the fire was, these entries will be sealed off for some time yet, so as to insure that the fire is extinguished. After the ventilation had been restored, the temporary stoppings built by the helmetmen were reinforced by stoppings of a more permanent character. The mine was inspected by County Inspector James Walker on Saturday, Jan. 2, and found in good condition. Hoisting of coal was resumed on Monday, Jan. 4.

ADOPT PRECAUTIONARY MEASURES

In order to prevent a recurrence of such a fire, the use of permissible explosives has been introduced in the mine, and a demonstrator has been giving instructions to the miners on the proper use of the explosives. A further precaution adopted by the company is that of having the firerunners follow the shotfirers at an interval of about a half-hour, whereas formerly the firerunners did not begin their work until after the shotfirers had finished theirs. The firerunners work in pairs until they have covered the entire mine, after which they separate, and return over different courses, to insure that no fires will be missed.

Drying Washed Coal

BY F. E. BUTCHER*

SYNOPSIS—Giving capacities of centrifugal driers installed at Mine No. 8, of the Tennessee Coal, Iron & R.R. Co., near Birmingham, Ala. Comparative economy in the use of the drier in coal-washing plants. Saving effected in fine coal that otherwise is lost. This recovery amounts to several hundred tons a month. Tabulated results in the washing of coal.

Last spring we completed the building of a coal-washing plant for the Tennessee Coal, Iron & R.R. Co., at their No. 8 mine, just outside of Birmingham, Ala. Included in that plant were two of our centrifugal driers. The nominal capacity of the plant was 100 tons per hour, or 50 tons per hour for each of the two driers.

The writer has just seen a letter written by Mr. Robert Hamilton, consulting engineer of the T. C., I. & R.R. Co. to one of our friends, advising that the driers have given no trouble and that the moisture in the coal coming from the driers is reduced to about $7\frac{1}{2}$ per cent. The letter states further that, with both machines running, an output of 1100 tons has easily been handled in ten hours; and with only one machine in operation they have handled 750 tons in 10 hours. In other words, they have demonstrated a number of times that it is entirely feasible to operate these machines at the rate of 75 tons per hour.

This plant is so designed that the washed coal coming from the jigs flows directly into the driers together with a large amount of water. There is at least as much water as there is coal; and the coal is delivered constantly with the moisture content already noted above. This $7\frac{1}{2}$ per cent. of moisture content includes about 2 per cent. internal moisture, so that the surface moisture is reduced to approximately 5 per cent.

So far as the cost of doing this drying is concerned, it is a little difficult to give any definite data, because we have all been carefully feeling our way, in this matter, and are hardly prepared to make a definite statement about this feature. There is one thing certain, however, and that is that this system is very much cheaper than any previously known system. As all are undoubtedly aware it has been customary either to drain the coal slowly, by a system of drainage bins, or to build large drainage pits and allow the coal to stand in these bins or pits for from 24 to 60 hr.; and then the coal would have to be rehandled from these bins or pits to the cars or loading bins.

The expense of installing either bins or pits is, of course, much larger than the original investment in centrifugal driers. The driers, however, possess the further advantage that they get rid of a lot of dewatering elevator equipment, which is expensive both to install and to maintain. Without a question of a doubt, the coal-washing plant at the T. C., I. & R.R. mine No. 8 is the simplest plant in the world, so far as its flow-sheet and operation are concerned; and Mr. Hamilton, and also the executive officers of the T. C., I. & R.R. Co., have assured us that, in

their opinion, it is the best coal-washing plant in the world, from the standpoint of results accomplished.

There is nothing to wear out about the centrifugal drier, except the fine perforated screens, and the renewal of these screens is an inexpensive matter. The total cost of drying coal, at the rate noted above, is the power consumption, which amounts to from 20 to 25 hp. It would take almost that much power to drive a properly designed dewatering elevator capable of handling an output of 75 tons per hour; and such a dewatering elevator would deliver coal having from 15 to 25 per cent. moisture. On the other hand, the drier delivers coal with the moisture content previously mentioned.

There is a further important advantage in the use of a centrifugal drier. The water from the drier contains some solid matter in the form of extremely fine coal. This fine coal amounts, according to carefully conducted experiments, to about $1\frac{1}{2}$ per cent. of the total material handled through the drier. In some cases, the amount of this fine material going through the drier screens is larger. All of this water coming from the drier with the finely divided coal that it contains goes to a central sump, from which it is elevated, by a centrifugal pump, to a cone settling tank about 40 ft. in diameter and nearly 70 ft. high. This cone settling tank delivers the fine coal, from a valve at the bottom of the tank, directly to the driers where it is again entrained with the coarse coal coming from the jigs, and thus provides an additional recovery for the plant. The overflow water from the large settling tank goes back to the jigs again as feed water.

This additional recovery of extremely fine coal, which is of course the highest-grade coal about the plant, amounts to several hundred tons each month and is consequently an economy that is not possible in the ordinary coal-washing plant where dewatering elevators are used. Mr. Hamilton also states, in his letter, that this large tank has operated continuously since early in July, without any attention, repairs or changes of any kind being necessary. Owing to unusual demands this washery has been operated most of the time on double-shift.

I believe that the following memoranda showing some recent results in the operation of this washery will be of interest to readers of COAL AGE. Note that the washed coal carries an ash content of only 4.71 per cent. and, further, that this ash content in the washed coal has not varied more than 0.3 of 1 per cent., at any time during the past five months. This emphasizes the close and accurate control that is possible in these machines. Four of these driers are installed in the plant of the Pennsylvania Steel Co., Steelton, Penn., but we are not in a position to give as intelligent an idea of what this plant is doing, because we have received as yet no data from them.

ANALYSIS OF COAL FOR WEEK ENDING OCT. 24, 1914

	Volatile Matter	Fixed Carbon	Ash	Sulphur
Raw coal	31.31	58.06	10.63	1.88
Washed coal	32.60	62.69	4.71	1.47
Boiler coal	26.53	48.53	23.94	3.17

PERCENTAGE OF REFUSE (SPECIFIC GRAVITY 1.37)

Float	6.4	Yielding ash	4.71	Sul.	1.59
Sink	93.6	Yielding ash	68.55	Sul.	4.95

SEPTEMBER RECORD

Raw coal	100.0
Washed coal	87.3
Boiler coal	6.4
Refuse	6.3

*General manager, The American Concentrator Co., Springfield, Ohio.

Electric Arc Welding in Mine Repair Shops

By E. S. ZUCK*

SYNOPSIS—The apparatus required, as well as the possibilities of this process of repair, are here enumerated. An inspection of the scrap heap at any coal mine will reveal the opportunities for saving which this process possesses.

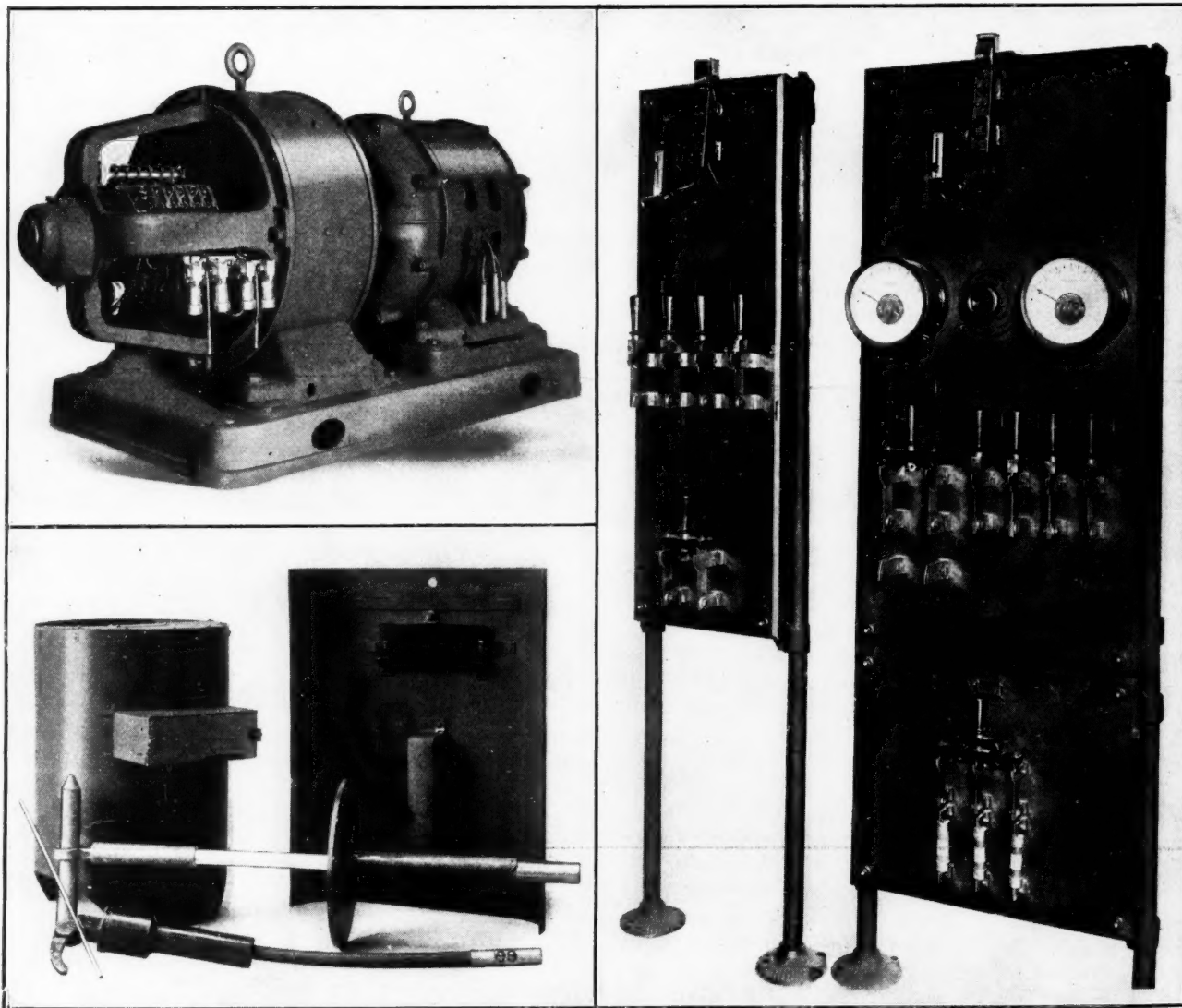
The application of the electric arc process of welding has been growing rapidly in recent years, and it is now used extensively in foundries, machine shops and railway repair shops, both electric and steam. In the latter, it has been found specially efficient in repairing worn or broken parts of locomotives and cars, and in many cases the savings made in two or three months' operation have equaled the original cost of the welding apparatus. The

*Westinghouse Electric & Manufacturing Co., East Pittsburgh, Penn.

mining industry, being a large user of machinery of one kind or another, should also be able to realize large savings by using arc welding in repair shops.

Arc welding may be described as the utilization of the heat of the electric arc to melt and fuse together the two materials to be welded. Two processes are in common use today, known respectively as the carbon and the metallic electrode processes. In both cases, one side of an electric circuit is connected to the article to be welded, while to the other side is attached an electrode, which consists in one instance of a carbon or graphite rod and in the other of an iron or steel rod.

The process of welding includes three distinct operations, viz., preparation of the work, striking the arc, manipulation of the electrode, filling material and the article being welded.



FIGS. 1, 3 AND 4. SHOWING LOW-VOLTAGE MOTOR-GENERATOR SET, SWITCHBOARD AND TOOLS USED IN ELECTRIC WELDING

PREPARATION OF THE WORK

It is absolutely essential that the article to be welded be free from dirt, grease, scale and other foreign matter. Failure to observe this rule carefully is without question responsible for 90 per cent. of the failures in arc welding. It is necessary in many cases to resort to chipping so that the weld may be started on bright metal. A good stiff wire brush is also useful in cleaning the work.

Having thoroughly cleaned the work, the next step is to prepare the spot to be welded by shaping it to receive the weld. If a crack in a plate or bar is to be repaired, it should be chipped out with cold chisel and hammer so that a V-shaped groove is formed. If a broken casting is to be repaired, temporary supports for the broken member will be required. Projections such as lugs or lifting bails may have to be built up, and molding blocks of iron, carbon or fireclay will be required. Occasionally it will be advisable to preheat the metal before welding, so as to avoid cooling stresses and insure even contraction. A furnace for preheating will therefore be required. This may be constructed of ordinary firebrick, a gas flame being preferably used to bring the metal up to a cherry-red heat.

STRIKING THE ARC

The operation of cleaning the article and preparing it for welding having been completed, one side of the welding circuit should be connected to the work. If the piece is small, this is most conveniently accomplished by having an iron table on which to place the article, the table being permanently connected to one side of the welding circuit. Where the article is large, the current conductor can be fastened to it with a clamp or simply hooked on without clamping. If the carbon electrode is used, filling material should be within easy reach. The operator then touches the electrode to the work and instantly withdraws it, thus striking the arc.

The carbon electrode should be withdrawn to a distance of two or more inches from the work. Little difficulty will be experienced in striking the carbon arc. With the metallic arc, the electrode has a tendency to stick and will frequently "freeze" to the work. Moreover, the arc is quite short, and in fact can seldom be operated longer than $\frac{3}{16}$ in. The operator must feed the electrode down into the weld at about the same rate as that at which it melts off, and the electrode must be held perfectly steady or the arc will be broken. A good plan for a beginner is to start with the carbon arc, and as skill is acquired, he can progress to the more difficult metallic arc process. It will often assist materially in the latter if the operator provides himself with a steady rest for his arm.

MANIPULATION OF THE ARC AND WELD

After the arc is struck it is allowed to play on the piece, and if the carbon electrode is used, this is given a rotary motion by hand. With the metallic process the electrode is itself both the heating element and filling material, and the arc is allowed to play on the exact spot where it is desired to deposit the metal. With the carbon electrode, the filling material should be added a little at a time, the arc, of course, being continued meanwhile until the metal is thoroughly melted and the weld made.

As soon as the metal commences to cool it should be hammered thoroughly in order to prevent sponginess and to give it a finer grain. Hammering the weld also tends

to work out any scale or slag which may have formed during the welding stage. Skillful operators endeavor to perform the entire welding operation with a minimum number of applications of the arc, avoiding interruption and breaking of the arc as much as possible.

Direct current is most suitable for welding, and in fact must be used for the metallic electrode process. The carbon process requires a current of from 300 to 400 amp., and the drop across the arc will vary from 30 to 40 volts, depending on the amount of current and the length of the arc. On the other hand, the metallic electrode rarely requires more than 130 amp. with a drop across the arc of from 20 to 25 volts.

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Welding can be done from high-potential circuits, such as 125, 250 and 500 volts. This practice cannot be recommended, however, where much work is done, as it is wasteful of power, especially on 250- and 500-volt circuits. The usual practice is to install a motor generator, such as is shown in Fig. 1, the generator being a direct-current compound-wound machine, delivering 70 to 75 volts, while the motor is of suitable characteristics for the local power circuit.

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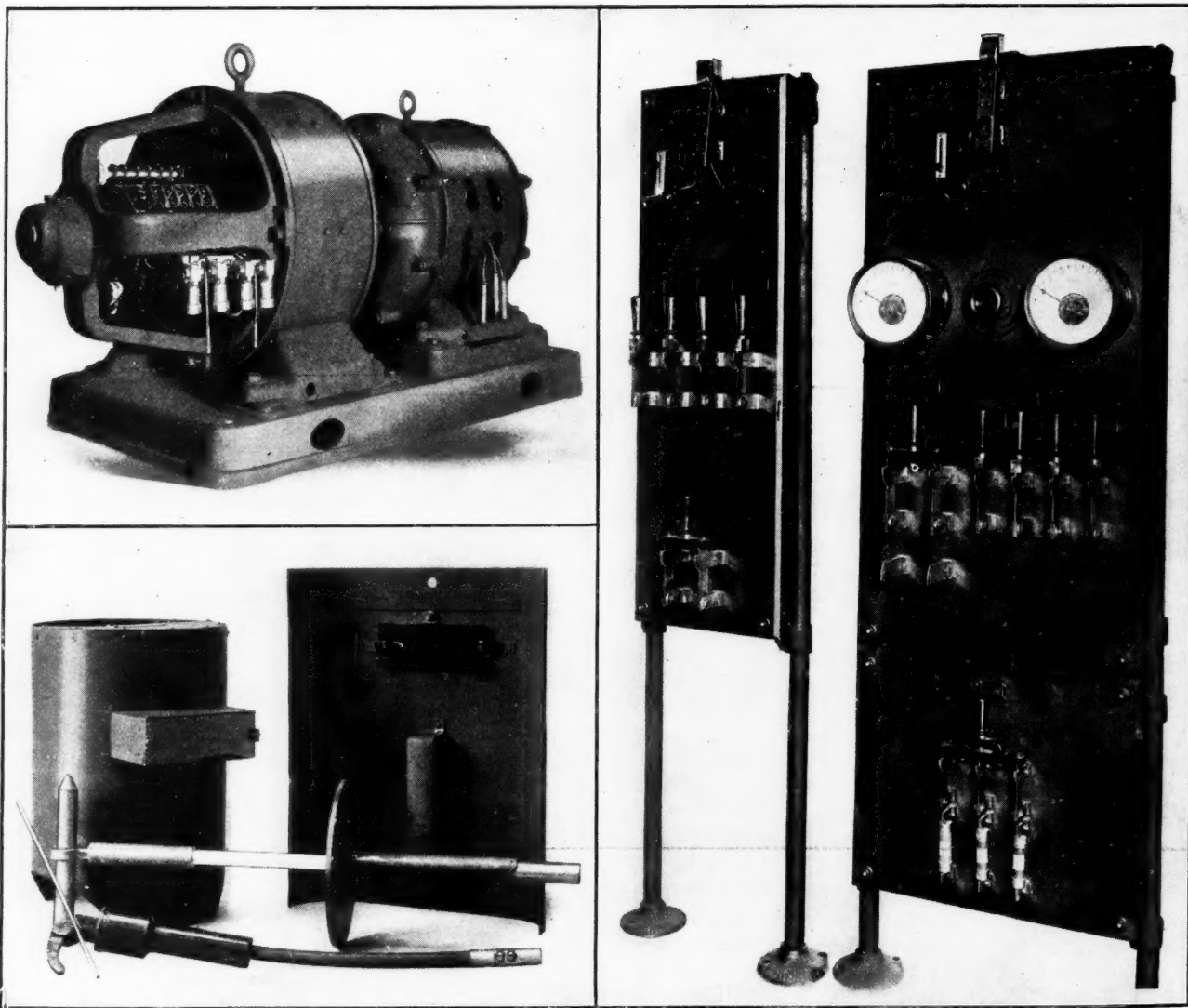
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The manipulation of this control scheme is so simple as to require little explanation. The operator closes the circuit-breaker and the two-pole knife-switch in succes-

sion, and then by closing one or more of the single-pole switches adjusts the resistance to give the current required. The current depends, of course, on the work and whether the carbon or metallic process is used. Fig. 3 shows a view of typical control panels for welding, the outlet panel being used when it is desired to have several operators work simultaneously.

Before leaving this scheme of control, particular attention is called to the polarity, the electrode being marked negative. There are several reasons for this. First, the positive pole provides nearly 75 per cent. of the total heat of the arc, and if the work being welded is positive, the heat is where it is most required. In the second place, there is a tendency, when the carbon electrode is used, for particles of carbon to be carried into the molten metal from the electrode, and since carbon hardens steel, the weld will be so hard that it will be impossible to machine or work it with tools. If, however, the electrode is made the negative, then the flow of current is from the weld to the electrode. This has been found to restrict the amount of carbon carried into the weld by the arc to a very small amount, so that little hardening of the material results. Hardening of the weld can also be further prevented by using a long arc—not less than 3 in. in length.

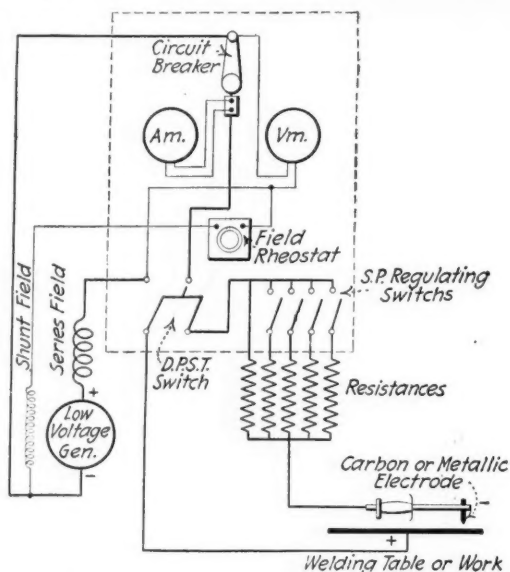


FIG. 2. DIAGRAM OF CONNECTIONS FOR ELECTRIC WELDING

This matter of polarity is also of importance in cases where it is desirable to do welding from the mine haulage circuit, one side of which is grounded. It is usually the case that the trolley wire is positive. It will not do, therefore, to connect the positive wire to the article to be welded without insulating the latter from the ground, otherwise a short-circuit would take place. If the article to be welded is placed on wooden supports, which will insulate it from the ground, then no trouble will occur, and if much welding is to be done it may be found best to make the trolley wire the negative, because with this arrangement no insulating supports will be required for the work. The operator, however, should stand on an insulated platform or mat when working with the welding electrode on the ungrounded side.

In addition to the welding generator and its control equipment, protective coverings for the operator, and electrode holders are required. The electric arc makes a

brilliant light, which is highly actinic. If the body is exposed to the bare arc a burn takes place which is quite similar to severe sun-burn. The skin reddens and finally peels off.

It is necessary, therefore, that the entire body of the operator be covered. Ordinary clothing is sufficient protection for the trunk and limbs, while the hands should be protected by gloves, and the operator should not work with his sleeves rolled up or shirt front open. Special protection must be provided for the head, two forms of which are shown in Fig. 4. The hood or helmet, shown to the left, entirely covers the head, and is provided with a colored-glass window through which the workman observes the welding operation. The glass in this window is specially selected to cut off the rays which are harmful to the eyes, and also to reduce the brilliancy of the arc to a degree comfortable to them.

The hood must be used when carbon welding is being done, as this process requires that filling material be added to the weld from time to time, so that both hands must be free. The shield shown to the right in Fig. 4 is used for metallic electrode welding, and is simply held in front of the face, thus affording sufficient protection, since the metallic arc is not so powerful as the carbon arc.

Fig. 4 also shows the two types of electrode holders. The electrode for carbon welding is a hard, solid graphite rod about 8 in. long and $\frac{3}{4}$ in. in diameter. Although occasionally broken, it does not wear away rapidly, and consequently does not require frequent renewal. The best metallic electrode material is Swedish or Norway iron wire about $\frac{1}{8}$ or $\frac{3}{16}$ in. diameter, cut in lengths about 12 in. long. These are consumed quite rapidly, about one per minute, and the holder is designed so that new electrodes can be quickly and easily inserted.

The application of electric arc welding to the repair of machinery, no matter of what type, can be classified under three heads—building up; filling in; welding together.

BUILDING UP

Machinery of all kinds is subject to wear which manifests itself in various ways. The kind of wear which can be repaired most efficiently by the arc welding process is that where friction has gradually ground or worn away the metal. Means are provided in all well designed apparatus to take up some of this wear, but there are limits beyond which it is necessary to replace the worn part. Repair of such parts is, therefore, a "building-up" process, by which it is restored to its original form and dimensions.

There are many examples of this application. Fig. 6 shows a case where the threads on the end of an armature shaft had become so badly worn that they would no longer hold the nut. New metal was welded onto the shaft and the lower view shows the appearance of the rough weld. The upper view shows the same shaft after it was turned and new threads cut. The complete operation in this case cost 65c. and saved more than a new shaft, because this armature was of an old design and not arranged so that the shaft could be pressed out and a new one substituted without disturbing the windings.

Other examples of this class of welding are found in the building up of keyways in shafts, gears and pinions which have become worn and battered so that they no

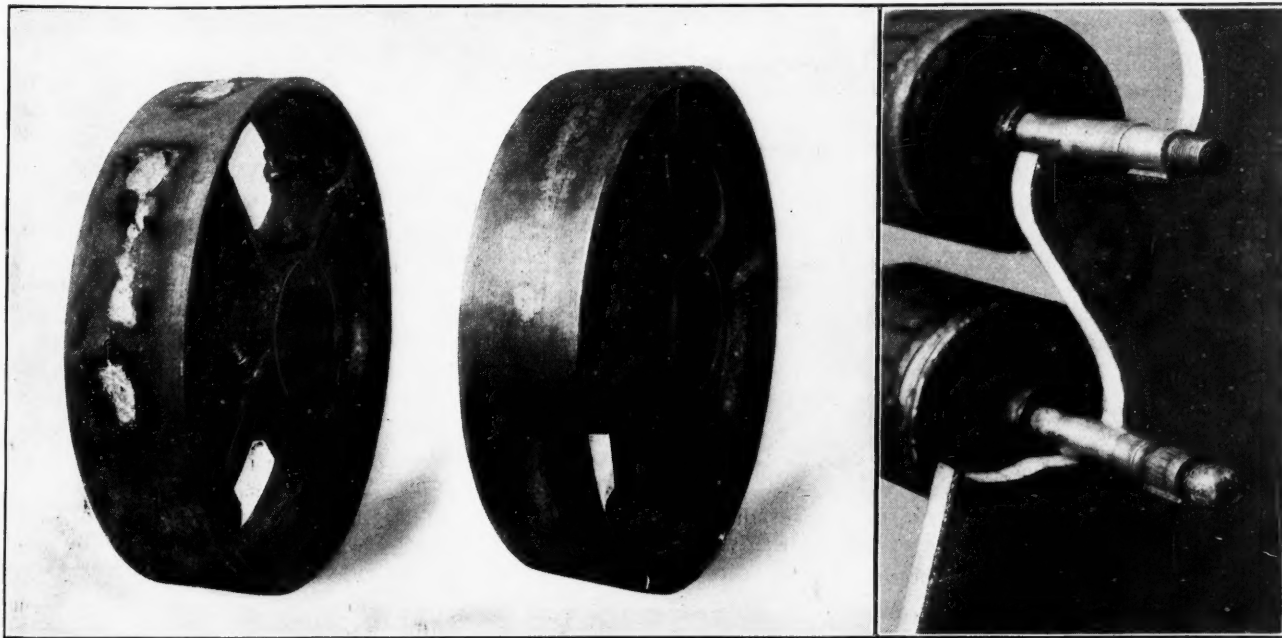


FIG. 5. BLOW-HOLES IN A PULLEY REPAIRED BY ELECTRIC WELDING BEFORE FINAL FINISHING WAS COMPLETE

FIG. 6. REPAIR OF A WORNOUT THREAD ON ARMATURE SHAFT

longer afford a tight fit for the key. It is simply necessary to fill them up by the metallic electrode process, after which new keyways can be cut in the same place. Brake rods and the like connected at the ends by pins are apt to have the holes therefor worn elliptical, thus causing lost motion and perhaps failure to operate properly. These elliptical holes can be easily filled up and new ones drilled.

A striking example of this class of repair work is found in steam railroad shops in the case of flat spots on locomotive drivers. When these develop it was formerly necessary to remove the drive wheels and turn the entire rim down to the same diameter in the wheel lathe. This operation was expensive, and also required considerable time during which the locomotive was idle. The new way is to weld fresh metal onto these flat spots by the electric arc, and then grind or file them down to a smooth

surface. These operations can both be performed without removing the drivers from the locomotive, and the net saving in money often amounts to over \$200.

FILLING IN

Although filling in may appear to be the same as the first process mentioned, nevertheless it is applied to a somewhat different class of work. The filling-in process is peculiarly applicable in repairing steel castings defective by reason of blow-holes, sand-holes etc. The distinction is that the defects have not been caused by wear. This application is common in foundries and machine shops. An example is shown in Fig. 5. The face of a cast-steel brake wheel developed bad blow-holes when partly machined. These have been filled up by the electric arc process, after which the machining has been completed.

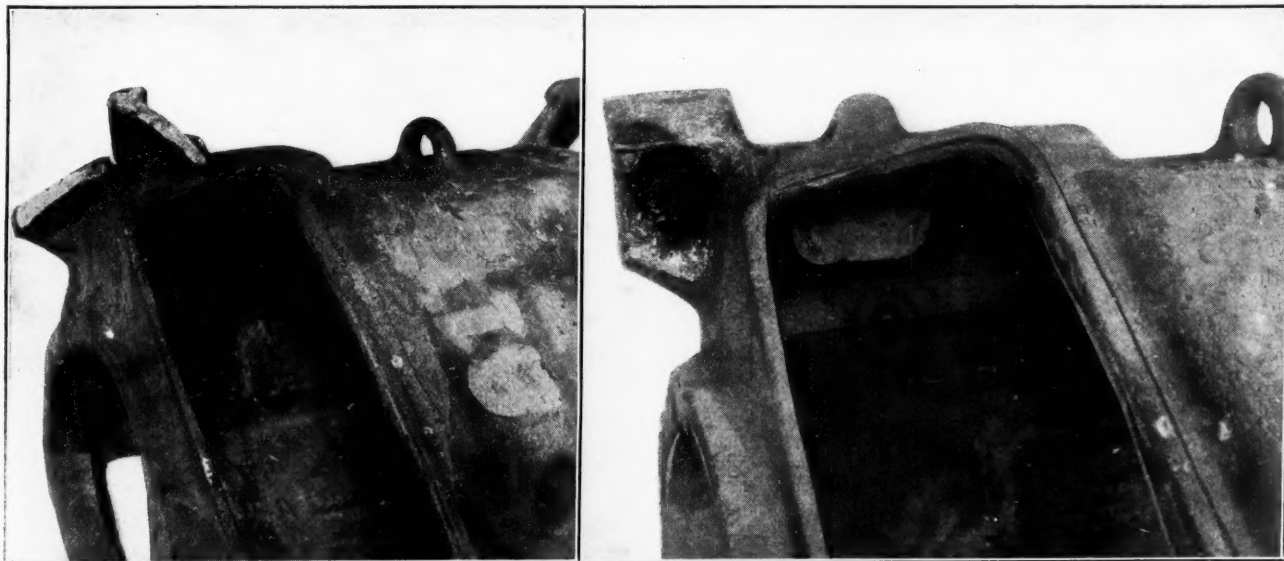


FIG. 7. BROKEN LUG ON MOTOR FRAME

FIG. 8. MOTOR FRAME WITH THE BROKEN LUG REPAIRED

WELDING TOGETHER

As the name implies, this operation consists in welding together the broken parts of machinery and equipment. This demands considerable care and skill, because the strength of the weld is usually of prime importance in such repairs. A most ingenious application is shown in Fig. 10. Six cast-steel motor frames were received from the foundry lacking the supports for the axle-bearing brackets. This was truly a serious defect, and the case looked hopeless. Arc welding came to the rescue, however, saving the frames and a considerable amount of money as well. Steel bars of suitable dimensions were prepared, and as shown in the picture were securely welded in place. One of the welds is seen plainly at the lower left corner of the motor frame. These welded supports have given entire satisfaction, apparently being as strong as those in a perfect casting.

Another example of this type of repair is shown in Fig. 7. This shows a cast-steel motor frame with a corner broken off. In Fig. 8 the broken piece has been se-

fibrous in structure, and furthermore has the peculiarity that it passes abruptly from a solid to a liquid condition, there being no intermediate stage during which it is more or less plastic. The principal difficulty seems to lie in controlling the hardness of the weld, which is usually so hard that machining is impossible despite all precautions.

Probably the best method of procedure is to heat the casting before welding to a white-hot condition and then weld, using the metallic electrode process.

After welding the piece should be thoroughly annealed. If, however, it is not necessary to machine the weld, the above method may not be necessary, although the results of welding are apt to be unreliable and uncertain no matter how skillfully the work be done. If a weld in cast iron will save the day, by all means try it, but do not be disappointed if the results are unsatisfactory.

There are many applications of arc welding in mine repair shops which could be mentioned. Only a thorough examination of the scrap pile can reveal its possibilities, and even then, when once facilities for welding have been

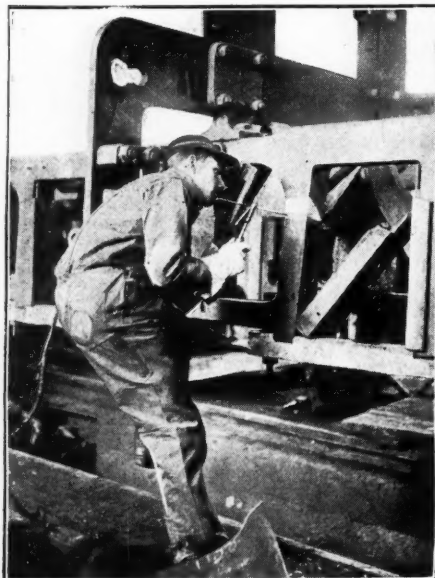


FIG. 9. WELDING A LOCOMOTIVE FRAME

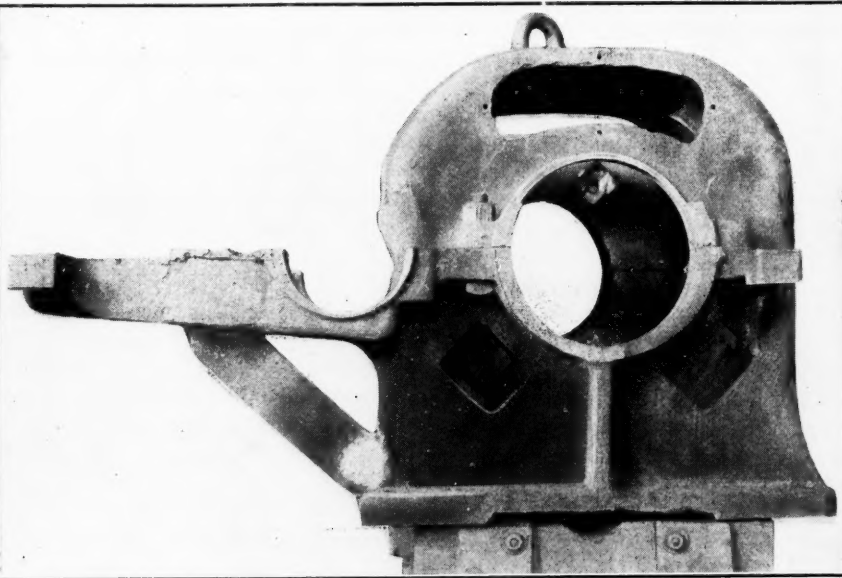


FIG. 10. A BRACE WELDED TO THE BEARING BRACKET OF A MOTOR CASING

curely welded in place and so skillfully has the work been done, that it is difficult to distinguish the weld.

A railroad-shop application is shown in Fig. 9, where a broken frame of a steam locomotive has been repaired by electric welding. The operator has used the metallic electrode process—the arc is not in use and the weld is shown in white. Note how the crack was first notched or V'd out so as to receive the weld properly. In the same manner a broken mine-locomotive frame of the cast-steel bar type could be easily repaired without loss of strength in the frame. The cost of welding the steam-locomotive frame shown in Fig. 9 was \$3.29.

The question often arises as to what materials are suited for repairing by electric arc welding. Cast steel, rolled steel, wrought iron and malleable iron can all be welded successfully with uniform results in the hands of experienced workmen. Malleable iron does not weld quite so easily, however, as the other materials mentioned. Cast iron, on the other hand, is not as suitable for welding as steel and wrought iron. It is crystalline rather than

provided, new applications will be constantly appearing. It is not experimental in any sense of the term, and should be included in the equipment of every shop engaged in the repair and maintenance of any considerable amount of equipment.



Canadian Mining Institute will hold its seventeenth annual meeting in Toronto, Can., Wednesday, Thursday and Friday, Mar. 3, 4 and 5. Headquarters will be at the King Edward Hotel. The Eastern Canadian Passenger Association has conceded special transportation privileges to members and their friends attending the meeting, based on the lowest first-class fare for the round trip on certificate plan. The conditions under which these are granted are as follows: (1) A single first-class ticket must be purchased not more than three days (Sunday not to be counted) prior to the opening of the meeting. (2) A standard certificate of such purchase must be obtained from the ticket agent issuing the transportation. (3) The certificate must be indorsed by the secretary of the institute and stamped by a representative of the railways, who will be in attendance at the secretary's office, The King Edward Hotel. (4) A fee of 25c. is charged for the validation of the certificate. Secretary S. Mortimer Lamb, Ritz-Carlton Hotel, Montreal, Que.

The Hampton Roads Coals--III

By F. R. WADLEIGH*

SYNOPSIS—This third installment of this series takes up the New River and Kanawha district coals in the same detail as the other districts have been treated. The fourth and concluding installment will appear in an early issue.

In 1873, the first New River coal was shipped to the East; and 10 years later, when the first shipment of Pocahontas coal was made, the output of New River district was 405,000 tons per annum. From that date to the end of 1913, 104,531,000 tons of New River coal

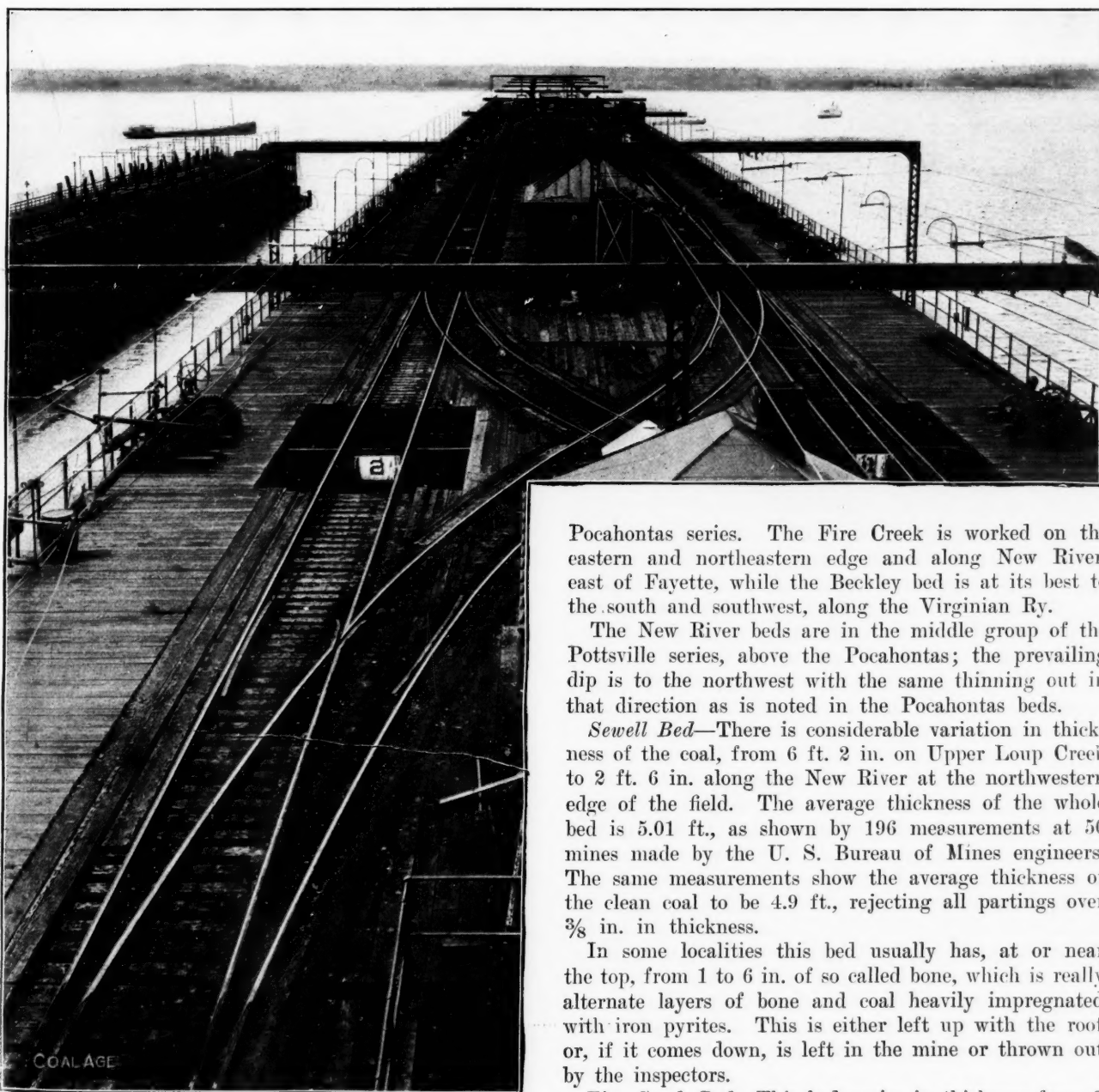
*Consulting engineer, 426 Real Estate Trust Bldg., Philadelphia.

have been shipped. From the Chesapeake & Ohio New River field comes about 63 per cent. of the total output of New River coal.

COAL BEDS

The beds mined are the Sewell, Fire Creek and Beckley. The coal from each bed is of the same character, structure and appearance, but with some variation in content, as shown later on; the greatest development is in the Sewell bed, which also covers the most territory. It is worthy of note that at no locality yet developed are more than two of these beds of workable thickness.

The Sewell bed underlies the whole New River area and is correlated with one of the upper beds in the



Pocahontas series. The Fire Creek is worked on the eastern and northeastern edge and along New River, east of Fayette, while the Beckley bed is at its best to the south and southwest, along the Virginian Ry.

The New River beds are in the middle group of the Pottsville series, above the Pocahontas; the prevailing dip is to the northwest with the same thinning out in that direction as is noted in the Pocahontas beds.

Sewell Bed—There is considerable variation in thickness of the coal, from 6 ft. 2 in. on Upper Loup Creek to 2 ft. 6 in. along the New River at the northwestern edge of the field. The average thickness of the whole bed is 5.01 ft., as shown by 196 measurements at 50 mines made by the U. S. Bureau of Mines engineers. The same measurements show the average thickness of the clean coal to be 4.9 ft., rejecting all partings over $\frac{3}{8}$ in. in thickness.

In some localities this bed usually has, at or near the top, from 1 to 6 in. of so called bone, which is really alternate layers of bone and coal heavily impregnated with iron pyrites. This is either left up with the roof or, if it comes down, is left in the mine or thrown out by the inspectors.

Fire Creek Bed—This bed varies in thickness from 2 ft. 6 in. on Piney Creek at the east to 6 ft. 11 in. about

THE N. & W. RY. CO.'S NEW NO. 4 PIER

four miles west of Thurmond. The average thickness is 4.14 ft., as shown by 68 measurements in 20 mines made by the U. S. Bureau of Mines engineers. The average thickness of the clean coal, rejecting partings over $\frac{3}{8}$ in. in thickness, is 4.05 ft.

Beckley Bed—This bed shows greater local difference of thickness owing to rolls and the variations in the bone or slate partings; where the total thickness is greatest, the partings are also the largest. As high as 11 ft. has been measured, varying down to 4½ ft. in the same mine.

The average thickness as shown by the Bureau of Mines measurements at 35 places in 10 mines is 5.33 ft., the average for the clean coal being 4.94 ft. Measurements by the West Virginia Survey in 22 mines show an average of 5.3 ft.

The slate or bone partings in all these beds vary both in thickness and relative position. In the Sewell and Fire Creek beds, where they thin down to 3 or 3½ ft., the coal is often clean from roof to floor.

DESCRIPTION OF COAL

In 1878 a report was issued by the Bureau of Steam Engineering, U. S. Navy, on trials of New River coal, comparing it with anthracite and Georges Creek. This report says:

New River coal is a first-class steam-producing fuel, 9 per cent. better than anthracite and 5 per cent. better than Georges Creek. Moderately coking, it burned freely, swelled slightly and coked properly, proving a first-class steam coal, well suited for steamship use. It was partly in lump and partly in dust, the latter at once cohering in the fire by coking. This coal requires but little labor in the furnace to work it.

This description applies equally well to the New River coal shipped today. It is of similar structure and appearance to Pocahontas coal, will average lower in ash, slightly higher in volatile and sulphur and has about the same variation in fusing temperature of the ash. It also averages somewhat higher in heat value. Like Pocahontas, it is a strong coking coal, burning with a short white flame and intense heat.

ANALYSES OF CARGO SHIPMENTS FROM HAMPTON ROADS DURING THE PAST THREE YEARS

	12 Cargoes		17 Cargoes		18 Cargoes		48 Cargoes		Slack
	Avr.	Best	Avr.	Best	Avr.	Best	Avr.	Best	
Moisture, dry coal			2.66		0.80	0.80			
Volatile matter	20.65	21.50	20.22	21.00	20.58	22.19	21.63	19.2	19.92
Fixed carbon	73.54	73.06	72.58	74.40	74.15	73.53	72.99	77.9	74.64
Ash		5.44	5.62	4.60	4.48	4.28	5.24	2.9	5.00
Sulphur	0.94	0.94	0.91	0.92	0.87	0.80	0.93	0.65	0.83
B.t.u.			14,815	14,942	14,900	15,314			15,018

Supplemental Notes—Average of 51 cargoes as delivered showed 2.49 per cent. moisture. Highest B.t.u. value in 70 cargoes (dry coal) was 15,260, the ash content being 2.90 per cent.; the average of the 70 cargoes was 14,879 B.t.u. The coal in the 12- and 17-cargo lots was from the Sewell and Fire Creek seams and the cargoes averaged 5000 tons each; these two sets of analyses, and that for the slack coal, were made by the Bureau of Mines, and the balance by Navy Department inspectors at Hampton Roads. The average analyses of 29 cargoes showed: Moisture, 2.81; ash, 5.55; B.t.u., 14,812, the maximum B.t.u. being 15,110 and the ash, 3.94. The slack analysis is given to show the average composition of the small coal.

As regards friability, the two coals may be considered about the same; if there is any difference, the New River coal has a slight advantage, as there are a few small areas in the latter district where the coal is distinctly harder than elsewhere in either field. For instance, there is one small mine in the Sewell bed where the run-of-mine coal will average 60 per cent. over 1½-in. screens by actual weight, as against an average of 30 to 35 per cent. in the rest of the field; at another large mine, the average over 1½ in. will run about 46 per cent. There is also an operation in the Beckley bed where the run-of-mine coal will average 50 to 55 per cent. lump and egg sizes.

A 5000-ton cargo of New River coal sent to the Italian Railways was tested for the percentage of small coal by running a large sample over screens 6 ft. 8 in. long, 3 ft. 3 in. wide and bars $\frac{3}{4}$ in. apart, inclined at an angle of 45 deg.; 35 per cent. of this coal went over the screens, the coal having been handled five times from the mine car.

The New River coals show an increase in volatile matter from the southeast to the north and northwest, exactly opposite to the Pocahontas coals in this respect. This variation applies, however, as a rule, to the Sewell bed alone, the Fire Creek and Beckley showing comparatively little change.

There is also a variation in the sulphur content of the New River coals, which applies almost entirely to the Sewell bed. This variation cannot be placed geographically and follows no direction, although it is most evident in one particular area, near the center of the field.

The variations in volatile and sulphur are as follows, according to the Bureau of Mines analysis, composite samples:

Bed	Volatile			Sulphur		
	From	To	Avr.	From	To	Avr.
Sewell	13.50	25.50	20.07	1.71	0.51	0.82
Fire Creek	14.54	19.42	16.98	0.97	0.47	0.66
Beckley	12.57	17.50	14.79	1.12	0.56	0.77

The ash content shows but little variation in all of the New River coals. Of the three beds, the Fire Creek is slightly higher in ash. The amount of oxygen in these coals also shows small variations and is remarkably low, which fact, with the small amount of ash, explains to a large extent their high heating value.

The ash-fusing temperature of the New River coals shows similar variations to the Pocahontas, from as low as 2200 to over 2600 deg. F. in the coal as shipped; some of this variation is doubtless due to difference in the preparation or cleaning.

In 1909, the U. S. Geol. Survey inspectors took samples from nearly all of the mines in the New River and Pocahontas coal fields. In the accompanying table the average analyses are figured from those as given in Bulletin No. 22, Bureau of Mines. In obtaining the averages given, the analysis of the composite sample from each mine was used.

MINE SAMPLES OF NEW RIVER COALS BY THE U. S. GEOL. SURVEY

	Sewell Bed ¹			Fire Creek Bed ²			Beckley Bed ³			All Beds ⁴
	Avr.	High	Low	Avr.	High	Low	Avr.	High	Low	
Moisture, dry coal	3.43	5.24	2.57	3.24	4.17	2.63	3.52	4.71	3.40	
Volatile matter	20.07	25.5	16.00	16.98	19.57	14.65	14.79	16.5	18.48	
Fixed carbon	76.43	80.71	71.10	77.72	81.20	75.47	77.42	82.19	77.42	
Ash	3.48	5.32	2.31	5.28	8.54	2.56	4.09	6.16	4.09	
Sulphur	0.82	1.36	0.51	0.66	0.97	0.47	0.78	1.12	0.78	
Hydrogen	4.81	5.02	4.58	4.68	4.92	4.08	4.75	4.87	4.75	
Carbon	86.06	87.95	83.95	84.94	87.66	82.35	85.78	87.46	85.78	
Nitrogen	1.55	1.66	1.33	1.50	1.64	1.36	1.52	1.60	1.52	
Oxygen	3.36	5.41	2.05	2.85	3.45	2.01	3.11	3.63	3.11	
B.t.u.	15,130	15,404	14,827	14,898	15,400	14,425	15,121	15,302	15,121	

¹ 51 analyses.

² 20 analyses.

³ 14 analyses.

⁴ 85 analyses.

KANAWHA DISTRICT COALS

The higher-volatile coals from the Chesapeake & Ohio district, a considerable tonnage of which is now being shipped from Hampton Roads, are generally known as Kanawha splint and Kanawha gas coals, rather a misleading classification. "Splints" refers to the laminated fracture of the coal and its supposed resemblance to the Scotch splint coals in that particular. The term Kanawha gas is applied indiscriminately to coals coming mainly from the No. 2 Gas, Eagle and Powellton beds running from 30 to 36 per cent. volatile and used for

many purposes. All of these coals come from the Kanawha district, in which there are six beds mined.

In ascending the series of beds, the coal changes, the lower ones containing some hard, splinty layers which increase in thickness until in the upper beds the coal is nearly all hard and of laminated structure, mining out in cubical or oblong blocks; it also has an increased percentage of volatile, and as a rule is somewhat lower in sulphur and with a higher ash-fusing temperature than the gas coals. In fact, many of the Kanawha splint coals may be considered as practically nonclinking, the ash-fusing temperature showing over 2900 deg. F. in some instances.

The coals in this field were mined a number of years previous to the opening of the New River field. As far back as 1840 they were used at the salt works near Charleston, W. Va., and previous to the Civil War they were shipped by water to the Ohio markets, as they still are to some extent.

blocks, which stand severe handling. For this reason, these coals are in great demand for use where a lumpy fuel is required, as on locomotives.

It will be seen from the analyses that all of these coals are low in sulphur, comparing favorably in this respect with the New River Pocahontas coals; and what is of more importance, the ash of the splints, while higher than in the other coals mentioned, is practically non-fusible and makes little or no clinkers.

These coals are very easy to fire, ignite readily, burn a long flame and give little waste of unconsumed fuel in the ash. In addition to the high percentage of lumps, they will get up steam quickly, are capable of giving high rates of combustion and a high evaporation per square foot of heating surface (the latter points being desirable features in locomotive operation) and throw comparatively few sparks, requiring also little slicing or raking of the fires.

For metallurgical purposes, especially in the making

TABLE OF ANALYSES OF KANAWHA DISTRICT COALS COMPILED FROM VARIOUS SOURCES

	Eagle		No. 2 Gas		Winifrede				Powellton			Cedar Grove		Coalburg		S-B.		No. 5 Block	
	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10	No. 11	No. 12	No. 13	No. 14	No. 15	No. 16	No. 17	No. 18	
Moisture.....	0.81	Dry	1.18	Dry	1.55	1.66	Dry	1.00	0.82	Dry	Dry	Dry	1.05	1.27	Dry	1.51	1.58	1.30	
Volatile matter.....	31.01	31.17	33.52	32.64	36.48	36.27	33.99	31.61	31.18	29.83	31.95	35.44	35.35	33.62	36.31	33.41	34.44	34.22	
Fixed carbon.....	63.09	64.52	59.78	59.88	56.85	57.10	60.92	61.72	64.79	63.31	61.44	56.29	58.19	58.84	56.21	59.01	55.83	61.43	
Ash.....	5.09	4.32	5.52	7.48	5.12	4.97	5.09	5.67	3.21	6.86	8.91	8.27	5.41	6.28	7.48	6.07	8.15	3.05	
Sulphur.....	0.86	0.61	1.29	0.94	0.85	0.81	0.70	0.78	0.64	0.80	0.60	1.38	0.95	0.70	0.61	0.86	1.23	0.76	
Hydrogen.....	5.30	.....	5.01	5.07	.....	.....	.....	5.01	5.00	4.98	.....	4.95	5.10	5.19	.....	5.52	4.69	4.81
Carbon.....	79.96	.....	78.92	80.03	.....	.....	.....	79.93	82.36	80.16	.....	77.14	78.09	78.09	.....	76.41	75.06	80.93
Nitrogen.....	1.17	.....	1.14	1.40	.....	.....	.....	1.24	1.11	1.65	.....	1.21	1.19	1.14	.....	1.19	1.11	1.23
Oxygen.....	7.62	.....	8.12	5.08	.....	.....	.....	7.67	7.68	5.55	.....	7.05	9.63	8.66	.....	10.03	9.76	9.22
B.t.u.....	14,709	14,909	14,277	14,384	14,345	14,371	14,470	14,358	14,931	14,517	14,460	13,995	14,217	14,133	14,086	13,868	13,418	14,397	

Eagle—Analysis No. 1 is the average of samples of air dried coal from 15 different mines, according to the W. Va. Geol. Surv. Analysis No. 2 is the average of 6 samples from one mine where the coal was 7 ft. thick at its best.

No. 2 Gas—Analysis No. 3 is of an average sample from 34 mines, according to the W. Va. Geol. Surv. Analysis No. 4 is of a shipment of mine-run coal, according to the U. S. Bureau Mines Bull. No. 22.

Winifrede—Analyses Nos. 5 and 6 are shipment samples of 14-in. coal, according to a private report of the Fuel Testing Co. Analysis No. 7 is the same of 2-in. slack and nut. Analysis No. 8 is the average of samples from five mines, according to the W. Va. Geol. Surv., Bull. No. 2. The ash-fusing temperature of the sample used in analysis No. 7 was 2910 deg. F.

Powellton—Analysis No. 9 is of mine samples, according to the W. Va. Geol. Surv., Bull. No. 2. Analysis No. 10 is of a shipment sample, according to the U. S. Bureau of Mines, Bull. No. 22. Analysis No. 11 is of a shipment of 13 cars sampled and analyzed by the U. S. Geol. Surv.

Cedar Grove—Analysis No. 12 is of shipment samples, according to the U. S. Bureau of Mines, Bull. No. 22. Analysis No. 13 is the average of mine samples from five different mines, according to the W. Va. Geol. Surv., Bull. No. 2.

Coalburg—Analysis No. 14 is the average of air dried samples from 13 mines on the C. & O. Ry., according to the W. Va. Geol. Surv. Analysis No. 15 is a shipment sample of 14-in. lump, according to a private report of the Fuel Testing Company.

Stockton-Belmont—Analysis No. 16 is an average from five mines, according to the W. Va. Geol. Surv., Bull. No. 2.

No. 5 Block—Analysis No. 17 is an average from ten mines, according to the W. Va. Geol. Surv., Bull. No. 2. Analysis No. 18 is the best obtained when making the analysis of No. 17.

There is no doubt that these coals will meet with an increasing demand at tidewater, as they are sold at a cheaper f.o.b. price than the New River Pocahontas coals and, for some purposes, give almost as good results, especially as locomotive fuel.

Typical analyses of the coal from each of these beds are given herewith, beginning with the lowest.

As in the Norfolk & Western fields, these coals are in the Kanawha series, the lower (gas) coals being softer, of columnar structure and lower volatile, and the upper beds containing the so called splint coals.

KANAWHA SPLINT COALS

Nearly all of the splint coals are shipped to the West, where they are largely used by railroads, at power plants, gas works, in the manufacture of malleable iron and for domestic heating. Large shipments are also made to storage plants on the Great Lakes, as these coals stock well and are comparatively free from liability to spontaneous combustion.

The name "splint coals" refers solely to their fracture and not to their appearance, as they are clean and lumpy, but break in layers across the seam instead of breaking with the vertical fracture of the New River and Pocahontas coals. While the latter fuels will average about 35 to 40 per cent. lump at the mines, the splint grades will run 70 to 75 per cent., the coal coming out in large

of malleable iron, these coals give excellent results, as they are low in sulphur and burn with a long flame and no clinkers. They also give good results in either gas-producers or in direct heating.

Owing to these many excellent properties, these fuels are readily sold in the Middle West. For many purposes they are also given preference over the semi-bituminous coals of higher theoretical heating value, such as New River and Pocahontas, especially with various types of overfeed stokers.

For domestic use the Kanawha splints always bring good prices and are in great demand, as they ignite readily, make a beautiful fire and do not injure the grates and heating surfaces.

In general, these coals are adapted for almost every use. They are among the best locomotive fuels in the country, good steam coals, either for hand firing or in stokers, and are excellent coking coals; they are largely used for the manufacture of illuminating gas, and are well suited for producer-gas work.

KANAWHA GAS COALS

It is worthy of mention that a coal from the No. 2 Gas bed gave the highest results of all coals tested, both in evaporation under boilers and in gas-producers, at the St. Louis testing plant of the U. S. Geol. Survey.

Eagle Bed Coal—This bed is correlated with the War

Eagle coals on the Norfolk & Western. It is an excellent steam coal and one of the best coking coals, especially for byproduct ovens. The bed varies in thickness from 4 to 7 feet.

No. 2 Gas Coal Bed—The greatest developments in the Kanawha field are in this bed, as it covers the largest area and varies from five to over ten feet in thickness. It is a good coking coal, an excellent all-around steam fuel, one of the best locomotive fuels in the country and suitable for gas-producer plants and heating furnaces; it is also largely used for the manufacture of illuminating gas and is much in demand for use in automatic stokers.

As might be expected, there is some variation in the constituents of this coal in different localities. As regards heat value, it is at its best near the eastern and southern edge, along the Virginian Ry. territory. There is also quite a little variation in the structure and hardness of the coal in this bed; in some localities it is all rather soft and of columnar structure, while at all other places there is a more or less thick section of a hard splint coal in the bed.

This coal, as well as that from the Eagle bed, is now extensively used at byproduct coke ovens, mixed with a certain percentage of the lower-volatile New River-Pocahontas coals. The resultant mixture gives about 25 per cent. volatile, which insures a high yield of both coke and byproducts as well as a better product structurally.

Winifrede Bed—This bed covers a large area and considerable new development is now going on, as it is one of the best splint coals in the region. There is a certain amount of the softer "gas" coal in this bed, making it a good all around steam, furnace and domestic fuel, and there is no better coal of its class in the country. The new developments toward the southwest are showing even better than the original openings along the Kanawha River, the volatile matter and ash decreasing and the heat value increasing.

Powellton Bed—This bed underlies a comparatively limited area, with only eight mines opened. It is, however, superior to most of the Kanawha coals for steam or coke making; it is a soft, friable coal of columnar structure, resembling the New River product. The thickness of the bed varies from 4½ to 6 feet.

Cedar Grove Bed—This is the lowest of the splint coal beds. It is largely used for domestic purposes, but is also good steam fuel. It is rather softer than the higher splint coals and the thickness of the bed varies from 2 ft. 10 in. to 3 ft. 6 inches.

Coalburg Bed—This bed has the greatest development of any of the splint coals, covering a large area and varying from 4 to 8 ft. in thickness. Like the Winifrede bed, it contains layers of softer "gas" coal and at one mine a 6- to 8-in. layer of cannel coal. It is interesting to note that these two beds are never both found of workable thickness in the same locality. What has already been said about the splint coals generally applies also to this bed.

Stockton-Belmont Bed—This is another of the splint coal beds, the coal from which is largely used for domestic purposes. It covers a wide territory, the thickness of the bed running from 4 to 12 ft., with partings.

No. 5 Block Bed—This bed in the Alleghany series is identical with the Lower Kittanning of Pennsylvania

and the Roaring Creek of northern West Virginia, where, however, it is a semibituminous coal. In the Kanawha field it is a hard, splinty fuel, high in volatile, with layers of softer coal. It is a good steam and domestic coal.

KENTUCKY FIELD

It is probable that some of the coals from this field may come to Hampton Roads in the future, but owing to the freight rate differential, they are of no importance at this time and will not be included in this description, except to say that they are bituminous coking and gas coals.

(To be concluded)

Extracts from a Superintendent's Diary

We men have a way of assuming that the weight of the world is entirely upon our shoulders, and we take ourselves seriously in consequence; in fact, if any of our women graciously offer to share the burden with us, we are apt to become quite disconcerted and grave.

But now and then our well meant importance suffers a shock and before our equilibrium is entirely restored we are treated to a little surprise.

For more than a year now I have been giving ear to any suggestion that seemed to offer possibilities toward building up the moral atmosphere of our village; sanitary requirements, housing conditions, street improvements, amusements; in fact, any suggestion was welcomed and an investigation followed. In spite of my desires and best efforts, results have not been satisfactory, and last night I remarked to my wife that it seemed to me that some of the women of our camp were inspiration proof.

My wife put down the embroidery, on which she had been working, deliberately, and in a very impressive manner said: "Say that again, and don't choke on the word women."

I obeyed instructions.

"And now," continued my wife, "will you please recall for my benefit some of the impressive conversations you have had with these women from which they might be expected to absorb inspiration?"

I hesitated; he who hesitates is lost.

My wife followed up the advantage and became eloquent. She always waxes eloquent when she realizes her superiority.

"You men, what do you know about inspiring women? Isn't it about time that you learned that the only way to build up the morals of a community is to listen to the women of the community, instead of attempting to instruct them? What do men know about morals, anyway?"

When my wife addresses me as "men" I do not attempt to interrupt her conversation; experience has taught me that it is not wise, and so I allowed her to continue.

"You build houses that are intended for homes to be ruled over by women, and yet you never discuss the plans with a woman for comment or approval. You decide on sanitary regulations that are to make these homes habitable and you tell the men that they must carry them out. And yet all of the regulations must be

carried out by the women if they are carried out at all.

"You decide that you will insist on a certain moral standard for your citizens, and the next day you men appoint a company physician who will eventually drive every woman who craves motherhood out of your camp. A moral atmosphere and no mothers! We lived in such a town in New Mexico."

Fortunately, one of my mine foremen came by for a little conference just then and I was allowed to retire peacefully from my wife's presence.

"Mack," I said to the foreman after we had concluded the business which had brought him to our house, "what do you think would happen if we made an effort to take all of the women in the camp into our confidence whenever matters of social and moral welfare were under discussion?"

"But how would we go about it?" ventured Mack.

"Personal interviews, of course," I replied.

Mack gave me a searching look to see if I were in dead earnest, and then he began to grin.

"Say, Mr. Thompson," he said, "my wife has a jealous streak in her; how about Mrs. Thompson?"

Mack didn't expect a reply, so I didn't disappoint him.

The Labor Situation

SYNOPSIS—Attempts to settle the eastern Ohio dispute fail. The conciliators concede the operators' argument. Trouble in Oklahoma ordered at an end by national union officials.

Failure again marked the efforts of the miners and operators in the eastern Ohio field to arrive at a wage agreement. The conferences which had been held in Columbus, continuing for more than two weeks, were adjourned sine die last week without any tangible results. The miners' representatives finally and conclusively refused the plan of arbitration suggested and Secretary-Treasurer Green announced after a conference of miners' officials that no plan of arbitration would be accepted. Thus all the talking went for naught and the mines are still idle.

The federal investigators Daniel J. Keefe and Hywel Davies completed their work and left for Washington, D. C., to submit it to the Department of Labor. A partial report was given out before leaving which will undoubtedly be included in the complete summary, and some of this we quote as follows:

The Federal Conciliators Support the Operators

It has been said by the miners that the present mining price in the state of Ohio is the equivalent of the price paid under the old contract. The miners say that their equivalent to the mining price is based on the screening percentage of the whole state. But the operators contend that the Policy Committee of the United Mine Workers of America, approved by referendum vote, instructed that each district, sub-district or group of districts was to renew its old contract, except where the method of mining coal has been changed by law or otherwise. In such places the price to be paid for mine run would be the equivalent of the price paid per ton for screened coal.

It has been said that percentages in the Hocking Valley district were 72 lump and 28 screenings, and that the equivalent of the price in that district would be 49.64c.; while in the Cambridge field the percentages were 68 and 32, and the price for that would be 47c.; while in the eastern Ohio field the percentages are 64 and 36 and the price for mine run should be 44.61c. If this is true, it would show that the Hocking Valley district has received a reduction of 2.64c. on the equivalent price they paid under the old contract; and that the price for the Cambridge district of 47c. per ton is equivalent to the price paid last year. So that if the miners and operators should conclude a contract on any price less than the price paid or established in the state of Ohio, the operators in the Hocking Valley could not make serious objection to it, because they have already received a reduction of 2.64c. on the last year's price. And if the percentage is correct for the Cambridge field, the operators there could not advance any argument why their scale should be lowered.

The eastern Ohio district includes Harrison, Belmont and Jefferson Counties and a small portion of Monroe. But the northwestern part of Jefferson County belongs to the Bergholz

district, and a small part of Harrison is also not included as part of the eastern Ohio area.

The Freight Question

A protest was filed recently with Governor Willis against the rates on coal from Hocking Valley points destined for Lake Erie. These are alleged to be discriminatory in favor of West Virginia coal, by the United Mine Workers of Ohio. John Moore, president of the Ohio miners, told Governor Willis that there is no truth in reports that eastern Ohio miners will support the Gallagher senate bill, which seeks to amend the mine-run law by permitting miners and operators to sign a contract on another basis than the mine-run system. The governor was told by the committee that railroads charge 75c. a ton for hauling Ohio-mined coal from Armitage, Athens County, Ohio, to Toledo, while they haul West Virginia coal from the same point for 35 cents.

The Work of Starting a Pump Too Heavy for a Mine Foreman

Three representatives of the International body of the United Mine Workers were obliged to make a trip to Spadra, Okla., recently to restore discipline among 150 striking miners, who had refused to recognize their contracts with two of the mines at that place, and who remained idle against the orders of their district managers. The miners disregarded a telegram from President White, instructing them to resume work and submit their grievance to the district board of the union and operators, as provided in their contract.

Upon learning this, Mr. White sent Vice-President William McLaughlin, District President Edward Cunningham, and International Organizer Rube Fern to Spadra as his personal representatives. Not until their arrival did the miners return to work. The mines in which the trouble occurred are those of the Spadra Creek Coal & Mining Co. and the Eureka Mining Co.

The miners went on strike first in the early part of January, but returned to work at the direction of the district managers. The sole grievance was their objection to the custom in the Eureka company's mine of having the mine foreman start and stop the electric pump and attend to oiling it. The miners demanded that a pumpman be hired for that duty.

They did not submit the question to the board for arbitration, and under the terms of the contract, the operators assessed the stipulated penalty for failure to do so. The men protested against this penalty, and a second time quit work, still without the consent of their district managers. President White's agents persuaded them to submit their grievance in the proper way, and the question of hiring a pumpman is now pending before the district board of operators and miners.

The President's Colorado Coal Commission

The commission appointed by President Wilson, consisting of Seth Low, Charles W. Mills and Patrick Gilday, on Jan. 19 wrote to the "open-shop" operators of Colorado, drawing attention to the arrangement of the Colorado Fuel & Iron Co., by which the men have formed a species of union to confer with the employing company on the conditions of employment and other matters of concern. The commission points out "that any plan under existing conditions is likely to be received more cordially and be acted upon more successfully if it reaches its final form in cooperation with the President's commission, and that it would be likely to be better received by the public."

In reply 71 operators, having in their employ 7546 men and producing 5,024,193 tons in 1914, declare that they watch the action of the "Fuel company" with interest, but are skeptical as to its success. They declare that the laws requiring them to recognize union labor are unconstitutional, and that checkweighman have always been conceded to the miners. They call attention to the fact that the Colorado legislature, now in session, is about to provide a board of mediation, so that one like that in the anthracite region is unnecessary.

The National Elections of United Mine Workers' Union

The national election of officers for the United Mine Workers' Union is now reported closed, with John P. White, president, receiving 153,389 votes; Frank J. Hayes, vice-president, 150,558 votes; William Green, secretary, 122,768 votes. John P. White and Frank J. Hayes were unopposed, but William Green had an opponent in J. L. Sims, who received 45,378 votes.

It is creditable to the union that White, who has had nothing but defeats to his credit, with the exception of the victory in the West Virginia strike, and who, faced by bad times, has not raised wages appreciably anywhere, has been returned to office. It shows that the miners are not fickle, and are willing to follow a leader of character even if success does not fall to his lot.

Hand Firing of Boilers

"Hand Firing Soft Coal Under Power-Plant Boilers," is the title of Technical Paper 80, just issued by the United States Bureau of Mines, as an aid to the firemen employed in manufacturing establishments throughout the United States.

The paper, which contains descriptions of methods of firing soft coal under power-plant boilers and of methods of handling fire so as to make the least smoke and to get the most heat from the fuel, seeks to meet the needs of the men, many without a technical education, who are employed in small plants of 1000 to 2000 hp. capacity. For this reason the language used is plain and simple, and technical terms have been avoided as far as possible.

The publication under "General Directions on Firing Soft Coal," makes the following statements:

THE FIRE SHOULD BE UNIFORMLY THIN

When burning bituminous coal under power-plant boilers the best results are obtained if the fires are kept level and rather thin. The best thickness of the fires is 4 to 10 in., depending on the character of the coal and the strength of the draft. The coal should be fired in small quantities and at short intervals. The fuel bed should be kept level and in good condition by spreading the fresh coal only over the thin places where the coal tends to burn away and leave the grate bare.

Leveling or disturbing the fuel bed in any way should be avoided as much as possible; it means more work for the fireman and is apt to cause the formation of troublesome clinker. Furthermore, while the fireman is leveling the fires a large excess of air enters the furnace, and this excess impairs efficiency.

The ash-pit door should be kept open. A large accumulation of refuse anywhere under the grates should be avoided, as it may cause an uneven distribution of air. Whenever a coal shows a tendency to clinker, water should be kept in the ash pit. All regulation of draft should be done with the damper and not with the ash-pit doors.

MAKING THE CHARGE EVEN

In firing, the fireman should place the coal on the thin spots of the fuel bed. Thin and thick spots will occur even with the most careful firing, because the coal never burns at a uniform rate over the entire grate area. In places where the air flows freely through the fuel bed the coal burns faster than in places where the flow of air is less. The cause of this variation in the flow of air through the different parts of the fuel bed may be differences in the size of the coal, accumulations of clinker, or the fusing of the coal to a hard crust. Where the coal burns rapidly, the thin places form.

Before throwing the fresh coal into the furnace the fireman should take a quick look at the fuel bed and note the thin spots. In a well-kept fire these spots can usually be recognized by the bright, hot flame. The thick places have either a sluggish smoky flame or none at all. In order to place the coal over the thin places the fireman should take a rather small quantity of coal on his scoop, for it is much easier to place the coal where it is needed with small shovels than with large ones.

COAL DOES NOT BURN IN HIGH PLACES

The coal should be placed on the thin places in rather thin layers. If the fireman attempts to fill up the deep hollows in the fuel bed at one firing, the freshly fired coal may fuse into a hard crust thus choking the flow of air, causing the fuel to burn slowly and starting new high places. If the high places in the fuel bed are missed on one or two firings the hard crust at the surface will gradually burn through or crack, thus allowing more air to flow through, and the place will get back to its normal condition.

Of course, if the high place in the fuel bed is caused by clinker the flow of air will not be free until the clinker is removed with the fire tool. Whatever may be the cause of the high places in the fuel bed, the fireman should remember that they are places where the coal does not burn. There is no use in placing coal on such a place.

WHEN FIRINGS ARE INFREQUENT

If the firings are too far apart the coal in the thin spots may burn out entirely, allowing a large excess of air to enter the furnace in streams. If those streams of air are not properly mixed with the gases from the coal, only a

small percentage of the air is used for combustion, and most of it passes out of the furnace, depriving the boiler of considerable heat.

If, for instance, air enters the furnace at atmospheric temperature, say 75 deg. F., and leaves the boiler at about 575 deg. F., it carries away the heat that was absorbed in raising its temperature 500 deg. F. This heat is lost to the boiler. Another loss of heat occurs when holes form in the fuel bed, because pieces of unburned coal fall through the grate when the fireman attempts to cover the holes with fresh coal. Therefore, in order to avoid the formation of holes, firings should be made at short intervals, particularly if, for any reason, the fuel bed must be kept thin.

Copies of Technical Paper 80 may be obtained by addressing the Director of the Bureau of Mines, Washington, D. C.

A Portable Dead-Weight Tester

The accompanying illustrations represent a new portable device for testing pressure gages by dead weight. Differential pistons have been utilized to create a hydraulic multiplication, and friction between the parts has been minimized, says *Power* for Nov. 3. The gage to

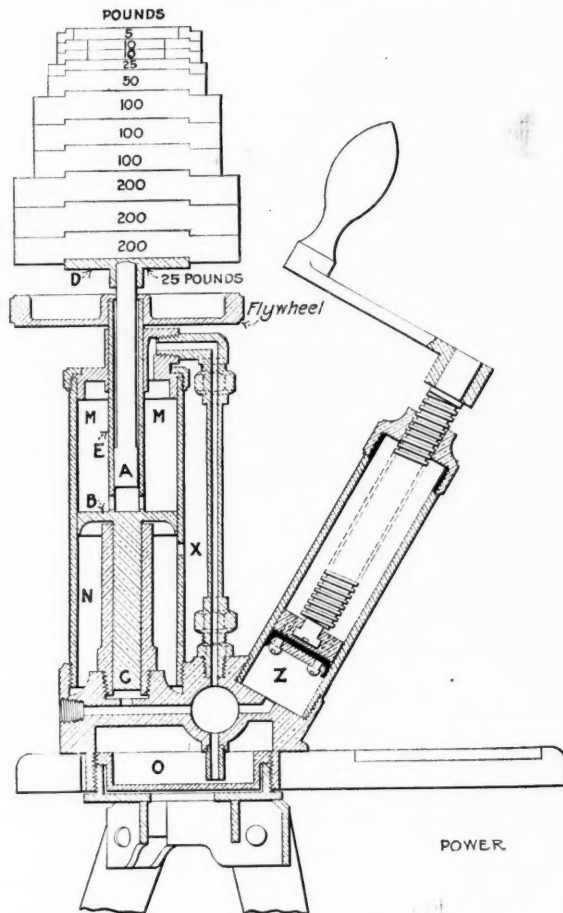


FIG. 1. SECTION THROUGH PORTABLE DEAD-WEIGHT TESTER

be tested need not be removed from its working position after putting in a tee below the gage. This instrument may be used with or without tubing and tripod to reach an elevated gage or as a bench machine without a tripod. The oil used to transmit pressure to the gage also serves to keep the working parts lubricated.

The design is based on the fact that the pressure applied to the surface of a fluid is transmitted to every part of it. Referring to Fig. 1, the area *B* is an exact

multiple of the area *A*. If the area *B*, for example, is 20 times that of *A*, and a one-pound weight is placed on the tray of the piston *D*, its pressure is transmitted undiminished to each surface unit of area *B*. In other words, the area *B* is exerting a pressure of 20 lb. on the area *C*. For example, let the area *C* be $\frac{1}{5}$ sq.in. Hence the weight registered by the gage is $20 \times 1 \times 5$ or 100 lb. per sq.in. In the same way the proportions of the plungers have been worked out to read pressure in kilograms per square centimeter. Decreasing either or both of the areas *A* and *C*, *B* remaining constant (for manufacturing purposes), the gage reading increases. If *A* and *C* increase, the pressure under *C* decreases.

As the weight employed is multiplied from 1 to 500 times, according to the capacity of the machine, so likewise the retarding effect of the friction would be multiplied. This serious obstacle has been overcome by the attachment of the flywheel to the piston *E*. The inertia of the floating weights allows the piston *E* to rotate around the piston *D* free from the effect of friction. The flywheel, carrying with it the piston *E*, eliminates the effect of friction within the cylinder, thus allowing

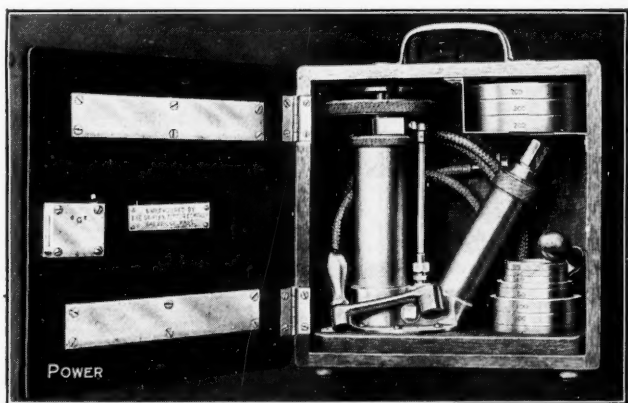


FIG. 2. TESTER IN CASE

the weights employed to give their true multiplied weight. The weight of the pistons is regulated in different instruments to give a reading of an even five on the gage for convenience. This is known as the initial constant and in high-capacity instruments is 25 lb. Therefore, when the weights, 1000 lb., are placed on the tray, the gage, if correct, should read 1025 lb. If it fails to register according to the weights used plus the initial, the error is at once evident. The constant value of a dead-weight test makes it the only true test.

This instrument is initially filled by immersing the tube in a vessel of oil and unscrewing the handle shown at the left of Fig. 1. This fills the oil cylinder *Z*, after which it is conveyed to the gage when attached and below the areas *A* and *C*. The direction of flow is controlled by the three-way cock. When the test has been made, the oil is stored for the next test in the reservoirs *N* and *O*, which are connected by a duct, and to the reservoir *M*, if desired. Air compression below the area *B* is eliminated by the hole *X*.

This equipment may be packed in a case, Fig. 2, its weight being but 17 lb. for tests from 1000 to 5000 lb. and as low as 13 lb. for tests to 500 lb. Heretofore, 200 lb. dead weight has been necessary on the ordinary $\frac{1}{5}$ -sq.in. tester to make a test to only 1000 lb.

This instrument was invented by Richard C. Cox, Cambridge, Mass., and is manufactured by the Simplex Tester Co., Brattle Building, Harvard Square, Cambridge, Mass.

Recent Legal Decisions

Damages Recoverable for Conversion of Coal—When a railway company converts to its own use coal entrusted to it for transportation, the damages recoverable by the owner are measurable by the reasonable market value of the fuel at the place where the appropriation occurs. (Texas Court of Civil Appeals; *Campbell vs. Q., A. & P. Ry. Co.*; 170 Southwestern Reporter, 859.)

Place Where Coal Company May Be Sued—A coal company organized under the laws of Maryland, operating mines in Pennsylvania, and authorized to do business in New York, may be sued in any one of the states for injury to a miner sustained in Pennsylvania. (United States District Court, Northern District of New York; *Teti vs. Consolidated Coal Co.*; 217 Federal Reporter, 443.)

Surrender of Leases—The mere fact that a lessee of coal lands indicates a purpose in the future to surrender his lease, and make no further payments to the lessor, and his subsequent failure to make payments, does not establish a surrender. The president of a corporation, as such, has no implied authority to surrender a lease belonging to the company. The release must be evidenced by corporate action the same as a conveyance of property. (West Virginia Supreme Court of Appeals; *Laing vs. Price*; 83 Southeastern Reporter, 497.)

Assumption of Risk by Miner—Where a miner was required to sound the roof of his working place and set props after blasting, he assumed the risk of being injured through a fall of slate where he started to remove coal without conforming to that custom. And this is so although he was only 20 years old, it appearing that he had worked in the mine more than a year and understood the nature of his work as well as if he had been an adult. (Kentucky Court of Appeals; *Music's Administrator vs. Northeast Coal Co.*; 170 Southwestern Reporter, 971.)

The Efficiency Expert

The devil opened the furnace door
And heaved in a shovel of coal,
When out there popped on the scorching floor
A truculent, half-baked soul.
"Look here, good devil," it said, "I pray
You will pardon my seeming haste,
I am—you must listen to what I say—
Appalled at your awful waste!

"Two-thirds of your heat goes up the flue,
Your coal is but half consumed;
If a modern plant should compete with you
This business were surely doomed.
Your times and motions I've studied well,
As you hustle the sinners in,
And I find you have here but a third-rate hell
For the way it is run is a sin!"

The devil grabbed up that critic then
With an angry shake and a flirt,
And said, "Go back to the world of men,
You efficiency expert!
If you stay down here you will get my job,"
(Here he uttered a dismal groan),
"But if you go" (here he gave a sob),
"You will fix up a hell of your own!"

—Chicago News.

Editorials

The Rockefeller Foundation

Among the illustrious personages who testified before the Industrial Relations Committee was one George W. Kirchwey, professor of law in Columbia University. We cannot help quoting his testimony, for it points out a real danger existing in the Rockefeller Foundation, which it is to be hoped we shall escape, but which, in all true Americanism, we feel assured of meeting even if we do not escape it.

Mr. Kirchwey is said to have made the following remarks. We presume they have not been glossed over, and we make somewhat broadly the assertion that we think we understand a part of them, just as we comprehend a small part of the publications of many other of our college professors who are writing on economics, not always with conspicuous clarity.

I should say that there was grave doubt as to whether the court would interfere with the Rockefeller Foundation by dissolution or otherwise if it undertook to use its funds in an educational campaign against workmen's compensation acts and against widows' compensation.

That it might furnish publicity agents to the Colorado Fuel & Iron Co. is a possible contingency that I have considered.

I should say that was extremely doubtful because of the fact that it is promoting a specific business enterprise there, and it would, I think, be very hard for it to persuade a respectable court that was not wholly under the influence, let us say, of the Colorado Fuel & Iron Co., but that there is a proper use of the corporation's funds.

I believe it could hire strikebreakers in the present state of public judicial opinion. Perhaps 10 years from now, no. It depends upon the progress of public opinion in the meantime.

Now there *is* and we will not deny it, a distinct danger that the Rockefeller Foundation may be put to bad uses. It may, for instance, engage such men as George W. Kirchwey, Scott Nearing, formerly instructor in economics at Swarthmore College, Pennsylvania, Richard Theodore Ely, professor of political economics at the University of Wisconsin, Henry Rogers Seager, professor of political economy at Columbia University, and even James Henry Brewster of the University of Colorado. With such men leading public opinion it might strive to bind capital with the cords of labor so seriously as to strangle the one and starve the other.

The men we have mentioned have already been appointed to positions largely paid, at least in most cases, out of foundations created by rich men like John D. Rockefeller, Sr. Their conclusions are probably wholly opposed to those of the men who donated their money to found the professorships and to build the colleges in which their lectures are delivered. In the sense, however, that their income is derived from the donations of rich men and that increased influence can be secured only by further contributions from the same source, these men are themselves the "hirelings of capital." We do not see that this fact has restrained their liberty.

All we do see is that Mr. Kirchwey desires to restrict the liberties of others. He does not believe in free speech for any one who disagrees with himself. Liberty to his narrow mind is permission to live on the benefactions of capital and spurn the hand that bestows it. He would

muzzle all other men who do not agree with him but have an idea that a liberal man is to be honored no matter how rich he may be, if his actions are honorable.

He is afraid that the Rockefeller Foundation, being, as he believes, a stepchild of the Colorado Fuel & Iron Co., will be opposed to pensions. We deny the relationship between the two, but if the coal company has commanding influence over the foundation it is quite likely that the latter will *advocate* pensions, seeing that the former has already established them.

In a degree we are afraid of the foundation until the legislature puts a clause in the constitution of that body excluding Mr. Kirchwey and all like him from participating in its affairs. But we are confident that it can do little harm, no matter into whose hands it may fall. We are not afraid of discussion, for we do not fear that the good judgment of the public will be much swayed by specious arguments.

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Coastwise Freights

No subject has been more discussed in the coastwise trade since the first of the year than the spectacular advance in ocean freight rates. There has been a world-wide shortage of ocean freighters since the war began, but it took five months for it to cause any advance in rates on the Atlantic seaboard. As far back as September the first steam colliers were withdrawn from their usual service between Hampton Roads and New England to take grain to Europe, but the bituminous trade was so depressed that this loss of available ships did not greatly handicap coal shippers. Even when the number increased and sailing vessels began to be chartered for South America their absence was hardly felt.

It remained for the prolonged bad weather to bring forcibly to the coal trade that there was an actual shortage of boats coastwise and a few urgent orders were enough to send freights from 65 to 70c. up to \$1 to \$1.10, all within three or four days. There the flurry stopped; pressing requirements were supplied, enough bottoms were found for the business offering, but rates have been held firm on the \$1 basis.

Meanwhile a few more coal steamers had been chartered on terms up to \$45,000 per month for a 7500-ton ship, some fore-and-aft schooners had closed at \$3500 to \$5000 per month for the Mediterranean, all to take cotton, and today there is no disputing the fact that there is only enough tonnage for a very modest movement of bituminous coastwise during the current season. The bottoms that can be brought from off the lakes are few in number and ill-suited for the trade, and the coal interests face a situation as complex as it is unusual.

The agencies that have transportation of their own have only enough ships to care for their requirements for such a year as 1914; they are hardly in position to undertake more. On the other hand, the shippers who are dependent on bottoms in the open market have so far been unable to cover their requirements for the year at

less than the current rate, and this in a market that insists on a delivered price.

The shippers *with* transportation set out to collect a premium for it, but general conditions were not encouraging enough to induce buyers to enter the market, except at a very slight advance over last year. These shippers therefore have sacrificed most of their extra profit. It is true they have some contracts, and those without bottoms have not, but consumers who have bought will draw from the same sources as last year and those who have not bought are more than likely to wait for propositions from those supplying them between now and Apr. 1. In other words, there is a stalemate; the one shipper wants to realize an extra profit on his transportation and can do so to only a small degree; the other wants to get transportation that will allow him to compete, and cannot. The results will be very much restricted shipments, at least for a while, after the 1914-1915 arrangements have expired.

The problem is, will present freights hold? If they do, then either those who own transportation will profit largely or the shippers without will be forced to net back a much smaller return to the mines in order to compete.

The Water Problem in the Anthracite Region

The amount of water to be handled in the anthracite region has probably reached a maximum, though greater depth will probably make the pumping of it year by year more difficult.

It is generally thought that the amount pumped should increase proportionately with the tonnage, but where the area over which operation takes place is but little increased this may not happen. The water enters the mines and is pumped out, and the rainfall is a better criterion of the water to be discharged than the tonnage mined. Of course much of the water in the anthracite regions is removed by tunnels. One long series of connected ditches connects the Forest City mines of the Hillside Coal & Iron Co. with the Coal Brook mine of the Delaware & Hudson Co., at Carbondale, and thence the water runs by gravity to the surface.

The Lausanne tunnel has a series of passages 13 miles long draining 14 collieries in the Panther Creek basin between Mauch Chunk and Tamaqua. The tunnel, 7500 ft. long, and its various connections took some few years to construct, so that the effect of its driving cannot be definitely traced to any one year. Connections were made between 1910 and 1913.

The first Oneida tunnel in Schuylkill County, 5600 ft. long, was driven about the same time. It relieved 5 large mine pumps. Later in 1913 another Oneida tunnel was driven 7030 ft. long which laid off 20 large pumping units, one of which was lifting water 500 ft.

It is largely to these changes that the reduction in water pumped is due. Still, unwatering the mines is an extremely heavy burden, far greater than that which troubles bituminous mines anywhere. A Welsh mine records as an exceptionally heavy inflow 8 tons per ton mined. The average rate in the anthracite field of this country is seen to be much heavier despite all that has been done to convey to the surface all waters entering the mine above drainage level and to prevent the inflow of surface waters.

The billions of tons pumped per annum seem almost unbelievable and lay a heavy burden on the cost of producing anthracite. The table we publish below will be found extremely interesting from this point of view. Unfortunately we learn that the water raised by skips is not included as water pumped.

CAPACITY OF PUMPS AND WATER PUMPED IN GALLONS PER MINUTE, TONS PER YEAR AND TONS PER TON OF COAL PRODUCED FROM 1903 TO 1913

Year	Capacity of Pumps Lifting Water to Surface, Gal. per Min.	Capacity of Pumps Lifting Water to Surface, Tons per Year	Capacity in Tons per Ton of Coal Produced	Gal. of Water Pumped per Min.	Tons of Water Pumped per Year	Tons of Water Pumped per Ton of Coal Produced
1903	745,690	1,634,179,635	21.7	447,351	980,369,716	13.0
1904	770,286	1,682,703,485	23.0	446,120	980,348,700	13.3
1905	791,994	1,735,654,851	22.1	439,707	963,617,890	12.3
1906	851,154	1,865,303,991	25.9	446,872	979,319,988	13.6
1907	902,216	1,977,206,364	23.0	454,855	996,814,732	11.6
1908	956,390	2,101,667,025	25.2	482,802	1,060,957,395	12.7
1909	961,240	2,106,557,460	26.3	465,119	1,019,308,288	12.7
1910	1,014,069	2,222,332,213	26.6	496,055	1,087,104,532	13.0
1911	929,248	2,030,446,992	22.4	490,201	1,074,275,491	11.8
1912	1,024,186	2,250,648,735	26.7	494,964	1,087,683,390	12.9
1913	1,037,009	2,272,605,223	24.8	489,600	1,072,358,400	11.7

Destination vs. Delivered Weights

There is a disposition on the part of prominent Indiana and Illinois operators to get together on certain features of contract business which have tended to materially reduce revenue in past years. One example in particular is the elimination of destination weights, and a disinclination to sell coal on a delivered basis.

Some of the consumers of steam coal, more especially public service corporations, contend that they should buy coal not only at destination weights but on a delivered basis. The competition for their tonnage, which is of considerable volume, has been so keen that this point has usually been conceded. The loss on shipments sold in this way has been found to approximate from 3c. to 6c. per ton because the operator is obliged to not only absorb the shrinkage in transit but assume the responsibility for pilferage, or any claims for loss or damage which arise before delivery to consignee.

The larger producers are discussing these questions with more frequency lately. Inasmuch as they are obliged to pay the miners for every ton of coal loaded at the pit mouth, they feel that all sales should be made at the same weights.

Looking Ahead

The next issue of COAL AGE will contain a valuable article describing a longwall conveyor and loader for use in thin seams. This machine can be moved forward as fast as the face advances. Actual results covering its use in Canadian mines are given. Another article next week will cover in detail the equipment and operations of a new mine in Utah. The mine is worked on the three-entry plan, the pit cars being weighed by an automatic recording machine. Coal dust is burned as fuel under the boilers. Other articles in this same number will deal with "Our Export Opportunities," "A Serious Accident Due to Flooding in a Canadian Mine," "Practical Rules for Cutting Mine Timber," "Facts the Consumer Should Know When Purchasing Coal," "A New Electric Mine Lamp." The March 6 issue of COAL AGE will be devoted exclusively to "hoisting and hauling," and will contain seven of the most valuable articles on these subjects that have ever been published.

Sociological Department

Kindergartens of the Colorado Fuel & Iron Co.

SYNOPSIS—The Colorado Fuel & Iron Co. has probably the only kindergartens to be found in the coal-mine villages of the United States. These have been established for many years and are quite popular among the employees.

We read a few weeks ago in the papers the statements of the union leaders about the illiteracy in the coal-mining camps of the Colorado Fuel & Iron Co., and as even we are prone to believe just what our union friends tell us, we were disposed to concede that the company had probably shown no particular energy in school work and had settled itself down to accept pioneer conditions with illiteracy and poor schools as part of the natural drawbacks.

But receiving a copy of the medical and sociological reports of the company for 1913-1914 we were led to ask Dr. R. W. Corwin for copies of earlier bulletins, and, after getting all he could supply, we importuned J. F. Welborn for more, and so we find that the Colorado Fuel & Iron Co., far from being a laggard in educational matters, was a leader in 1903 and still is unexcelled by any other coal operators in 1915.

CHARGE OF ILLITERACY IN COLORADO FUEL & IRON CO. CAMPS

If there is any illiteracy in the Colorado Fuel & Iron Co.'s camps the discredit of that fact must be laid principally to the individuals themselves or to the lack of fostering care of their native countries. If the leaders of these men in their revolts against order had done one-hundredth part as much for them as their employers, they might with much better grace condemn the company for the illiteracy of their followers.

But it is of kindergartens we would speak today, and first we would quote from the "Annual Report of the Sociological Department of the Colorado Fuel & Iron Co., 1903-1904." The summary of the welfare work of the company was made by Dr. R. W. Corwin, who was both chief surgeon of the Minnequa hospital and superintendent of the sociological department. He is now general manager of the work, and the Rev. E. S. Gaddis is superintendent. And, since 1906, a new president of the company rules instead of F. J. Hearne, namely J. F. Welborn. But the sociological department and the kindergartens are still active, and therefore we need no apology for quoting extensively from the report above mentioned. Please remember, however, that it was written in 1904, over ten years ago.

A REPORT MADE TEN YEARS AGO

The spread of the kindergarten movement during the last twenty or thirty years has been a significant fact in the educational life of America. From the first kindergarten started by Elizabeth Peabody and a few other women, who firmly believed in Froebel and his principles, they have come

to be a part of the incorporated school systems in most of our large cities. But kindergartens in a mining community and supported entirely by a mining corporation are, as far as we know, unknown outside the camps of the Colorado Fuel & Iron Co.

The aim of the kindergarten is to develop the three-fold nature of the child—his physical, mental and spiritual self—and his creative self activity. The kindergarten is but the first step in the process of education; it is the stepping stone between the home and the school.

THIRTEEN VILLAGE KINDERGARTENS

The company is now supporting kindergartens in each of the following camps: Sopris, Rouse, Starkville, Engleville, El Moro, Pictou, Primero, Segundo, Tercio, Berwind-Tabasco, Redstone and Crested Butte, while a new one is to be opened Sept. 1 at Walsen mine, thus making a total of 13 in all. Within the last 12 months the school boards at Berwind-



AWARD IN 1904 FOR FREE KINDERGARTENS

Tabasco, Primero, Segundo and Tercio have been paying the salaries of their kindergarten teachers or have been issuing certificates of indebtedness covering advances made by the company for this purpose. In all the other camps except Redstone, the company assumes not only the operating expenses but the teachers' salaries as well.

PECULARITIES OF WORK IN THIS FIELD

Our constituency makes necessary a few noteworthy differences in methods from those of the ordinary kindergarten. Many of the children come to us with no knowledge of English. This makes the first work with them difficult, but it is astonishing how soon they learn to speak and sing. Because of the deficiency in language a greater degree of occupation and construction work is given, since the children can imitate the teacher's work long before they can understand or follow language. An extensive use is made of pictures and objects.

The kindergartner is obliged to employ more than the usual amount of rhythm work and physical culture as the little bodies are often stiff and untrained. Many more than the usual number of games are played, and here again the progress is remarkable. Much time has been devoted to nature study, illustrated by construction work, which is in many cases exceptionally good considering the little hands that made it. Fairy stories, patriotism, courage, kindness and gentleness have been illustrated in this way and also by freehand cutting, drawing and water-coloring.

Books were made of the children's work, illustrating the Thanksgiving, Christmas and Easter thoughts, and these were carried home. Some of the homes are decorated with the children's work.

The strike disturbances have made surprisingly little difference in the attendance, for even where the strikers were compelled to keep off company ground it was no uncommon sight to see the mothers bring the children to the picket line and pass them through to the school, thus showing their confidence in the kindergarten teacher and the company that made her work possible.

CRESTED BUTTE

Special reference should here be made to the new kindergarten opened June 1, 1904, at Crested Butte, for it has the distinction of being the youngest in the system, the largest in enrollment and the greatest in elevation, being a mile and a half above sea level.

A new kindergarten is also to be opened at Walsen mine Sept. 1, 1904, and the school house is being enlarged and moved to a more central location in order to accommodate the little ones.

CHRISTMAS IN THE KINDERGARTENS

Although the strike was at its height at the holiday season it was not allowed to interfere with the happiness of the children. In keeping with the universal custom, the kindergartens made much of the joyous time and celebrated it with elaborate Christmas entertainments. The trees were decorated with bright and attractive ornaments of the children's own making, and fathers' and mothers' faces lit up as they received the simple gifts on which their own little ones' fingers had been busy for days beforehand.

Gifts for the little ones themselves were provided by the company in the form of a varied assortment of toys, so that each child received a substantial reminder of Santa Claus. The Colorado Supply Co., as usual, donated a generous supply of candy and oranges and in addition a box of fine French mixed candies for each teacher. The unburdening of the tree was preceded by simple exercises performed by the children, in several instances in conjunction with the public-school demonstrations.

While we have no kindergarten at Lime, Colo., there are many children of kindergarten age, and they were included this year in the Christmas remembrance. This seemed fitting as they had just dedicated a new schoolhouse at that place, and the tree and little gifts gave the children a pleasant introduction to their new building. About three hundred little ones were thus remembered in the various camps.

TEACHERS' HOUSES

The plan of setting apart separate houses for the use of the kindergarten teachers has amply justified itself, for not only are the teachers comfortably housed and sure of a permanent abode during the school year, but the houses have become headquarters and centers for social work. The furnishings of the teachers' rooms are thoroughly practical and sanitary and are intended to serve as a standard of taste from which housekeepers may realize how much may be accomplished with comparatively small expenditure. Teachers' houses are now fitted up in Berwind-Tabasco, Primero, Segundo, Engle, Rouse, Pictou and Crested Butte.

TEACHERS' MONTHLY MEETINGS

On the last Saturday of each month the kindergarten teachers have met regularly in Trinidad under the direction of their superintendent, Mrs. Margaret G. Grabill, for the purpose of conferring about their work and receiving instructions and suggestions.

At each conference some special line of work is taken up, demonstrated and discussed, and not only have the individual teachers been helped in this way but an esprit de corps has been developed that is of great value.

PUEBLO STATE FAIR

An exhibit of kindergarten work was made at the Colorado State Fair held in Pueblo in September, 1903, and the diploma to be awarded for the best work was given to our display.

LOUISIANA PURCHASE EXPOSITION

A much more complete exhibit of kindergarten work was sent to St. Louis where it is attracting considerable attention

because of its unique character and excellent workmanship. Whole mining camps, farmyards, houses and barns, gardens, windmills, kindergarten rooms, four- and five-roomed houses, each room furnished appropriately and all made by the little children, are among the features of the display.

Before the exhibit was sent to St. Louis it was displayed in the large show windows of the Colorado Supply Co. in Trinidad to the great delight of the passers-by. For a week or more there were groups of interested men and women constantly in front of the windows admiring the work and in many instances their delight was enhanced when they recognized the handiwork of their own children.

As will be seen in our illustrations the Colorado Fuel & Iron Co. received, as it richly deserved, a gold medal and a certificate in recognition of its free kindergartens in mining camps. For its kindergarten and the best industrial exhibit, it received another medal. A silver medal was granted for its method of housing employees in mining camps.

On our front cover will be seen how even the kindergarten children are being trained in first aid to the injured. We wish we could show you the pretty classrooms and the beautiful stages where these little "tots" are taught self-expression. We do not wonder at the enthusiasm of Doctor Corwin. Our readers would, we are sure, share it with him.



GOLD MEDAL FOR KINDERGARTENS

Anthracite Miners Good Patrons of Movies

The growth of the moving-picture business in the anthracite region of Pennsylvania shows a startling increase in the amount of money devoted to this form of entertainment. Five years ago there were nine motion-picture theaters in Wilkes-Barre with an aggregate seating capacity of about 1800. At the close of 1914 the aggregate seating capacity of the sixteen motion-picture theaters in Wilkes-Barre was over 10,000.

Of these theaters one represents an investment of \$200,000, one an investment of \$150,000 and a third an investment of \$50,000, as compared with the \$4000 or \$5000 which was the average cost of the little theaters of five years ago. One of these theaters charges from 15c. to 20c. admission, one charges 10c. and the rest 5c. Most of them give performances from 10 in the morning until 11 at night, and prominent film men state that at the extremely moderate estimate of filling the theaters only once a day the aggregate daily receipts are \$750, or over \$32,000 a year.

There are four film exchanges in Wilkes-Barre, a city of 75,000 inhabitants, an unusual number for a place of this size, but it is in the center of the anthracite region, which is stated to have more moving-picture theaters per square mile and more seating capacity per capita than any other section of the United States except the big cities. Every little hamlet in the region now has two or three theaters.

The population of the anthracite counties, according to the latest census report, is 1,122,361 persons; so if Wilkes-Barre, with a population of 75,000, spends \$32,000 a year on moving pictures, the total expenditure throughout the region is probably about \$480,000. The anthracite mine workers, their wives and families number 822,960 persons, or 73 per cent. of this population. This means that at least a quarter of a million dollars of their wages are spent annually on moving pictures. The proportionate calculation makes it \$350,000.

Discussion By Readers

Mining Laws, Legislation and Mine Regulations

Letter No. 32—In a general way, I am familiar with the mining laws of most of the coal-producing states and have followed the present discussion in COAL AGE with intense interest. Many important suggestions have been made, the adoption of which would, I believe, result in a material advance toward the goal of safety in mines.

In most mining laws that I have studied, it seems to me that too much is left to the discretion of the mine inspector. In this respect, our law makers have seemingly failed to take into account the human factor, which is always involved when an enactment is made subservient to the judgment of an official. Such a law is, in my opinion, too loosely defined and provides a loophole for its frequent violation.

While the mine inspectors throughout the United States are unquestionably, as a body, well trained and conscientious in the performance of their duties—men endowed with as high ideals of public service as it is possible to expect, it must still be admitted that they are but human and fallible. Among the number, there are, as a matter of course, a few who are incompetent and others who lack judgment, while still others are prone to show partiality in their dealings. For this reason I believe mining standards should be clearly defined by laws that would specify in simple, definite terms the numerous requirements necessary to safety in mining operations. To arrive at a proper standardization in respect to mining, I would suggest the appointment of a board of experts to work under the direction of the Federal Bureau of Mines. The findings of such a board, properly appointed, would not be tinged with the intrigues of state politics.

The duties of the board would be to consider the conditions in the various coal fields of the country, and, after a careful study, to determine the requirements that will provide the greatest degree of safety under existing conditions. Their efforts should be to standardize the requirements in regard to conducting ventilating currents; the construction of stoppings and air bridges; the shooting of coal and the timbering of working places; the best and safest methods of lighting mines; the safeguarding of electric installations in mines; and the foolproofing of mining machines and all mechanical appliances. In fact, the board should endeavor to standardize all mining requirements, methods and construction, as far as these relate to safety.

When the findings of such a board have been submitted to and approved by the several state departments of mining, they should be made the subject of special enactment in each state, in order to bring the mines operated in that state under their requirements.

I know there is a deep-rooted prejudice against a standard way of doing many things in mining. It is argued that each separate case requires individual treatment. However, I believe most intelligent mining men will agree that it would be better to have standard methods and

standard requirements that are suited to different conditions of mining and legalized by state enactments so as to wholly eliminate the human factor, which always results in the haphazard, disjointed and widely diversified systems that are now so prevalent in the different coal-mining states.

In closing, permit me to say that I believe that such a standardization as I have suggested would, to a marked degree, relieve the mine foreman from the embarrassment attending his present position, to which frequent reference has been made in this discussion. It would enable him to carry out, in good faith, the orders of both the superintendent and the inspector. It would bring into conformity the orders of a superintendent issued with an eye single to costs, and those of an inspector whose eye is blind to everything but safety.

FLAT TOP ENGINEER.

Crumpler, W. Va.

Letter No. 33—The West-Virginia mine-foreman law does not render coal operators in that state immune from liability, generally, for injury to miners resulting from a company's negligence or failure to install and maintain suitable and safe machinery, tools and appliances. This fact is emphasized in a decision just handed down by the West Virginia Supreme Court of Appeals, in the case of *Crockett vs. Black Wolf Coal & Coke Co.*, 83 Southeastern Reporter, 987. The court holds that the immunity of a company is limited to the duties imposed upon the mine foreman by the expressed and implied terms of the law. Accordingly it was decided that the law could not avoid defendant's liability for death of a mine motorman, caused by his coming in contact with an improperly attached trolley wire.

After pointing out that the mine-foreman law should be strictly construed in favor of injured miners, inasmuch as it abridges a long established right to recover for negligent injuries, the court shows that there is no language in the law that is fairly subject to an interpretation that would place upon the official any statutory duty of inspection, oversight, or repair of mining machinery or appliances, such as wires and cars; although said official is bound to "keep a careful watch over the ventilating apparatus" and pumps. "Nowhere," says the court, "does the statute say that the mine foreman shall see that the miners or other employees are provided with safe or suitable tools and appliances."

The decision holds that the jury was warranted in finding that defendant was guilty of negligence in failing to discover and repair the defective condition of the trolley wire, which neglect resulted in the accident, although the defect had existed only 16 or 18 hours.

Under the statutes of Alabama, a miner is not deprived of the right to recover for an injury resulting from a fall of slate, merely because he knew of the defective condition of the roof before the accident occurred, unless it was his duty to prop the roof or it

could be shown that some negligence on his part caused the roof to fall. The section of the mining law of that state which requires operators to provide props for use in working places does not absolve the operator from his duty to prop the roof, except where employees are specially directed to perform that duty. (Alabama Court of Appeals, *Phillips vs. Lookout Fuel Co.*, 66 Southern Reporter 946.)

Other instances could be cited where mining laws could be improved so as to more clearly define the duties and obligations imposed.

A. L. H. STREET,
Attorney at Law.

St. Paul, Minn.

Letter No. 34—I have followed with much interest the discussion, in *COAL AGE*, of mining laws, and desire to call attention to a few points that I believe have been neglected in previous letters.

The first point is the advisability of making *refuge stations* in mines compulsory by law. In an article entitled "Safety First—the Slogan Cry," *COAL AGE*, Vol. 3, p. 790, I advocated the enactment of a law requiring that refuge stations should be provided in all coal mines where the number of men employed underground exceeds 50; so that in case of an explosion of gas or a mine fire or any serious accident cutting off access to the surface, the workmen might find refuge in such chambers. In that article I tried to demonstrate the blessing such stations would have proved to many of our poor unfortunate brothers who have been entrapped and have lost their lives; but who would have been saved had such refuge chambers been provided in the mine. To prove this, I referred to numerous mining disasters that have occurred both in this country and in Europe, of which the records show that the victims lived, in some cases, several days before finally being overcome by the afterdamp.

I want to say, also, that the use of *naked lights* in mines generating gas should be prohibited by law. The lives that have been sacrificed on the altar of the naked light have been legion. In this list must be included the loss of life in mine fires that have been caused by the ignition of gas or combustible material stored in the mines, by the use of open lights. The accidental ignition of powder or detonating caps by sparks from open lights, which has so often resulted fatally, must be included in the same list. The large number of accidents from this cause should be sufficient testimony to warrant the enactment of a law prohibiting the use of naked lights in mines generating gas.

I am inclined to think that some form of electric light will provide the best means of illumination in coal mines. Electric lamps seem to be giving satisfaction to the companies who have installed them. When safety lamps are used, only a fully approved type of lamp should be adopted. Such lamps should be used in mines showing the least trace of gas, especially where fine dust is produced in greater or less quantity by the operation of the mine. In my opinion, only such types of lamps as are approved by the Bureau of Mines should be employed.

In this connection, I would draw attention, also, to the subject of *mixed lights* in mines. I believe the use of mixed lights should be wholly eliminated in coal mines. Many lives have been sacrificed, simply because the management of the mine permitted the use of naked lights

in certain portions of the mine, while one or more sections of the same mine were operated exclusively on safety lamps. An accidental fall of roof or a careless or forgetful employee has, in many such cases, been the cause not only of his own death but that of his fellow workmen.

I wish, in closing, to refer to one other point; namely, the *life of certificates of competency*. In my opinion, all coal-mining officials should be examined at least every five years, until they reach the age of 50, when they might be exempt from further examination. I believe such assistance would be a great stimulus to the efficiency of mine foremen and firebosses, since they would have to keep posted and uptodate on all matters of importance in connection with their work. This would be necessary, as all examinations would naturally keep pace with the improvements and advance made in coal mining. I believe that such periodical examinations should not only be made compulsory by law, but should be advocated by all mining corporations on the ground that such a system would provide naturally for more intelligent and efficient service, and insure, to a greater degree, the safety of men and the security of the mine and property.

J. W. POWELL,
General Contractor.

Windham, Mont.

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Stopping Payroll Leaks

Some time ago, *COAL AGE* invited a discussion by readers of the leaks that occur in coal-company accounts. The nature of mining accounts makes it impossible for the heads of operating departments to accurately check the various items of expenditure.

For example, the usual method of paying a contract miner is to have his account kept by an underboss and handed by him to the mine foreman, who in turn sends it to the colliery clerk and it is thus entered upon the payroll. The payroll is always most carefully checked, as to addition and extensions; but the correctness of the time turned in is seldom checked. The only check made at most collieries on a breast miner's account is the final check measurement of his breast when he has completed it, and if he should have a squeeze or any other common accident closing the place it cannot be measured.

There is no question but that the large majority of mine officials trusted with handling the payment of their employers' money are honest and would gladly welcome a check on their work. The check measurements made by the engineers when a place is completed do not begin to tell the complete story of the cost of the work measured. Those measurements show only the total distance driven. The many other items, which run quickly into high figures, are not included and cannot be, without considerably complicating the accounts, and increasing the labors and responsibilities of the mine foreman and his assistants. The nature of the numerous allowances of time, powder, etc., made for the constantly changing conditions that require the setting of timbers, sheet-ironing, driving headings, shooting rock, erecting batteries and platforms and other expenses is such that they go by without a check.

In order to stop the possibility of leaks, in the payment of contract miners, the only course open seems to be some method that will enlist the mining engineers as a vital part of the payroll force, in the way that they will check all items paid to other than company hands. It

will of course be impossible to make such checking apply to every payroll at the time it is due; but leaks can be caught, and the dangerous act of a foreman in arranging a price unknown to his superiors, which might afterward return to plague both him and them, will be avoided.

One source of temptation to a payroll clerk inclined to be "crooked" is the fact that the paymaster is not always informed when a man leaves the service of the company at a colliery; and it is possible then for a man to work a portion of a month, at the colliery of a big company and, through the aid of the timekeeper be paid for the whole month. For instance Stiney Balone is an employee of No. 4 colliery and leaves after having worked, say ten days in the month. By connivance with such a one, a dishonest foreman, timekeeper, or payroll clerk may report him as still on the roll and the main office or the paymaster will not know his account should have been closed on the tenth.

Where a company operates one or more than one colliery a man should be compelled to show a record of his former connection with the company if he has any, and if not he should be compelled to at least state the time and place where he was last employed. A form should be furnished every man who transfers from the outside to the inside workings, or who comes from another company; and he should be required to fill out the same with his full

name, as it appeared on the payroll of the company who employed him last, together with the date he quit his last place. The foreman or timekeeper should then date and turn this form in the same day, to the office, for entry on the payroll.

A vexing leak is often caused by the ease with which some fellows change their names and leave balances on the companies' books, for supply-house charges. The form just mentioned should be given by an employee when he seeks employment at other collieries of the same company, in the same locality. By requiring this form as the final act to secure employment at another colliery of the same or another firm, or in another department of an individual colliery, the possibility of an employee who is a drifter going from one job to another will be stopped. When a man is discharged he is usually sent to the colliery office and a statement of his time is given him. His record thus comes to the paymaster's notice and he closes the account. But it is the fellows who quit during the month and who, without getting their time statement, secure another job at the same colliery, that give the most trouble, because their names allow manipulation on the part of a timekeeper or clerk; and for these the suggested form would be most useful.

J. KENVIN.

Maryd, Penn.

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

The Heavy Hydrocarbon Gases—The heavy hydrocarbons occur in the coal measures as occluded gases, only to a limited extent. Of these, there are but two that are worthy of mention; they are

Olefiant gas, ethene or ethylene, (C₂H₄); sp. gr., 0.978;
Ethane, (C₂H₆); sp. gr., 1.0366.

Both of these gases are colorless and odorless; they occur but to a limited extent in association with methane; and their chief importance lies in the fact that they each have a wider explosive range and a lower temperature of ignition than pure methane. The analyses of the gases exuded from coal rarely show any appreciable quantity of olefiant gas (ethene); but ethane (C₂H₆) occurs more frequently as an occluded gas. The following table gives the percentages by volume of the constituents of natural gases obtained from various coals, in different localities.

TABLE SHOWING THE COMPOSITION OF GAS EVOLVED FROM COALS AT 212 DEG. F., IN VACUO.

Locality	CH ₄	N ₂	CO ₂	O ₂	C ₂ H ₆	Remarks
South Wales	62.78	36.42	0.80	...	...	Bituminous
South Wales	63.76	29.75	5.44	1.05	...	Bituminous
South Wales	87.30	7.33	5.04	0.33	...	Steam coal
South Wales	93.13	4.25	2.62	...	...	Anthracite
Lancashire	80.69	8.12	6.44	...	4.75	Cannel
Lancashire	77.19	5.96	9.05	...	7.80	Cannel
Westphalia .....	...	89.91	7.50	2.59	...	Gas coal
Westphalia	34.85	58.48	2.56	4.11	...	Gas coal

The following table gives the composition, by volume, of blower gas in different localities, which shows in a general way a higher percentage of methane, in comparison with that of nitrogen. This may be due, to a large extent, to the higher rate of transpiration of the methane, as compared with nitrogen, which tends to increase its percentage in blower gas over what actually exists in the pores of the coal:

TABLE GIVING COMPOSITION OF BLOWER GAS IN DIFFERENT LOCALITIES

Locality	CH ₄	N ₂	CO ₂	O ₂	CO	C ₂ H ₄
Austria	88.9	10.8	1.0	0.3	...	...
Austria	99.1	0.7	0.2	...	...	...
Austria	90.0	9.2	0.2	0.6	...	...
Germany	87.2	11.7	1.1	...	...	...
Germany	77.7	18.5	3.7	0.1	...	...
South Wales	96.7	2.8	0.5	...	...	...
Wallsend, England	92.8	6.9	0.3	...	...	...
Jarrow, England	83.1	14.2	2.1	0.6	...	...
Oakwellgate, England	98.2	1.3	0.5	...	...	...
Wilkes-Barre, Penn. ..	94.2	3.3	1.1	0.9	0.1	0.4

It is important to remember that the occluded gases of coal are not chemically combined with the constituents of the coal as shown by analysis, and do not form a part of the coal itself, although adding much to its inflammability and heat value.

The Coal Age Pocket Book

Occlusion of Gases—The occlusion of gases in coal or other solid substances is the result of the absorptive power of the substance for that particular gas. For example, platinum, palladium, gold and other metals, as well as coal (carbon), absorb varying quantities of hydrogen, nitrogen, oxygen, hydrocarbon and other gases.

The most common examples of occlusion are the absorption of hydrogen by platinum; and of methane, nitrogen, oxygen and carbon dioxide by coal and coal dust. The law that governs this absorption is unknown. The occluded gas is often held very strongly by the substance with which, however, it is not combined.

The occluded gases of coal seams were probably produced in the metamorphic processes that formed the coal; and their absorption (occlusion) in the solid formation may have resulted in the oxidation, to a limited extent, of the carbonaceous matter that was being transformed into coal. Such reactions, if taking place in the measures, together with the consolidation that accompanied the formation, would naturally give rise to the observed pressures of occluded gases.

The pressure of occluded gases in coal formations is very variable, depending not only on the conditions attending the occlusion; but to an even greater extent on the impermeability of the infolding strata, which has prevented the escape of the gases from the measures where they were formed.

Transpiration, Emission of Gases from Coal—The gases occluded in coal exude from its exposed surface in the same manner as perspiration exudes from the pores of the skin. The term "transpiration" relates to the motion of a gas through a capillary tube and thus describes the emission of gas from coal.

The velocity of transpiration is according to a different law from that governing the rate of the diffusion of gases. For the same gas, the rate of transpiration varies directly as its pressure or density, and inversely as the length of the tubes through which it must pass. The velocity of transpiration is independent of the material that forms the tube, but is affected by temperature, being less for a higher temperature, and vice versa.

TABLE GIVING THE RELATIVE VELOCITIES OF TRANSPIRATION OF MINE GASES (AIR = 1)

Gas	Relative Velocity	Gas	Relative Velocity
Hydrogen	2.066	Carbon dioxide	1.237
Olefiant gas	1.788	Carbon monoxide	1.034
Methane	1.639	Nitrogen	1.030
Hydrogen sulphide	1.458	Oxygen	0.903

The above table gives the relative rates or velocities with which the common mine gases transpire, referred to the rate for air as unity. The actual rate of emission of gas from coal, however, will depend chiefly on the pressure of the gas in the coal. Any sudden fall in barometric pressure is always accompanied with an increase in the emission of gas from the coal.

Inquiries of General Interest

Pumping by Compressed Air

I am in charge of a mine that has recently been flooded. The steam pump that we are using makes slow progress in draining the mine. As we have two air compressors that are at present idle and there is a 6-in. borehole that reaches from the surface to the lowest part of the mine, a depth of 180 ft., it occurred to me that we might employ the compressed-air method for unwatering the mine by pumping compressed air through a pipe to the bottom of this hole.

At present, the water stands 100 ft. deep in the hole. The borehole is 1600 ft. from where the air compressors are located. I would like to know the size of pipe necessary to convey the air from the air compressors to the bottom of the borehole, and the pressure that will be required at the compressor to transmit the air through the pipe and raise the water from the mine. I will be glad if you can give me any information that will help me in this matter.

JAMES KILKER.

Jessup, Penn.

An article on this subject appeared in *COAL AGE*, Vol. 5, p. 121. In the same volume, p. 560, was described an improved system that combined pumping with compressed air and the air-lift feature, which could not be applied, however, in the present instance where the problem is one of draining a flooded mine.

Before answering this inquiry, we might suggest that the operation of an ordinary pump by compressed air has the special advantage that the pump can be operated equally well when it is completely submerged. When operating a submerged pump by compressed air, it is first necessary to drive the water out of the air cylinder, which will require an air pressure corresponding to the head of submergence; or (if the exhaust pipe is carried up the shaft) to the vertical distance of the exhaust discharge above the pump. When the air has been expelled from the air cylinder two cases are presented: 1. If the air cylinder exhausts under water, the air pressure must be equal to the entire head of discharge or the entire lift from the pump to the surface. 2. When the air is exhausted through a pipe extended above the level of the water in the shaft, the air pressure required to operate the pump will then be only equal to the head of discharge less the head of submergence, or the vertical height of the point of discharge at the surface above the level of the water in the shaft. This will increase, however, as the water level in the shaft is lowered.

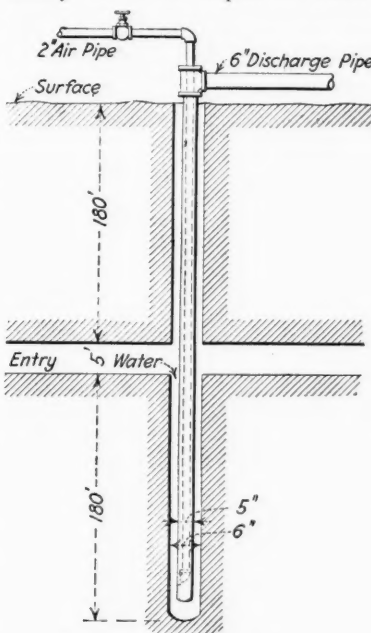
Referring, now, to the case in hand where correspondent suggests the use of compressed air to form an air lift in a borehole 180 ft. deep, it may be stated that such an air lift has been found to work economically only when the head of submergence is practically 50 per cent. of the vertical distance from the surface to the bottom of the hole. Disregarding frictional resistances, the air pressure required is then equal to the head of submergence

of the pipe in the hole. To start the flow of water in this column pipe, which is submerged to a depth of 100 ft. will require an air pressure of $100 \times 0.434 = 43.4$ lb. per sq.in. In the present case, however, after the flow is once started the air pressure is required to overcome a head of only $180 - 100 = 80$ ft. The working pressure is therefore $80 \times 0.434 = 34.72$ lb. per sq.in. at first, but increases as the pumping proceeds.

It must be observed that, as the water level in the shaft is lowered, the system will reach its limit of efficiency when the depth of water or the submergence of

the pipe is one-half the depth of the shaft, or 90 ft. At this stage, the system will work with less and less efficiency until it ceases to operate. In order to apply the air-lift system effectively, in this case, therefore, it will be necessary to sink the borehole to a total depth of 360 ft., so that the submergence in pumping will never be less than 50 per cent. of the total depth. This will, of course, increase the air pressure required.

Referring to the accompanying figure, a 5-in. pipe is shown dropped into a 6-in.



DRAINING A MINE BY
AIR LIFT

hole, which has been sunk to a total depth of 360 ft., or double the distance from the surface to the coal seam. The effective working pressure for this depth is $180 \times 0.434 = 78$ lb. per sq.in. Assuming an initial pressure at the compressor plant of, say 85 lb. per sq.in., and using a 2-in. pipe to conduct the air to the borehole, and dropping the same sized pipe (2-in.) down the hole inside of the 5-in. pipe, will give a loss of pressure of 3 lb. per sq.in., which will make the terminal pressure $85 - 3 = 82$ lb. per sq.in. This pressure will be sufficient to overcome the friction and elevate the water to the surface, for the subsequent drainage of the mine under normal working conditions.

When starting the operation of unwatering the mine, in this case, the actual submergence of the pipe is $180 + 100 = 280$ ft. This will require a terminal pressure at the bottom of the hole of $280 \times 0.434 = 121.5$ lb. per sq.in. To obtain this terminal pressure, it will be necessary to maintain a pressure of, say 125 lb. per sq.in. at the beginning of the operation. As the water is lowered in the shaft, this pressure will gradually be reduced to 85 lb. per sq.in., as previously stated.

Examination Questions

Miscellaneous Questions

(Answered by Request)

Ques.—What are the general causes of mine fires, and what precautions should be taken to prevent them?

Ans.—The most frequent causes of mine fires are the spontaneous ignition of fine coal and slack mixed with the waste of the mine in abandoned and poorly ventilated places. Other frequent causes are the ignition of gas, either accumulated at the roof or in void places or issuing as feeders from the strata, the gas being ignited by the flame of shots in blasting the coal. Fires are also caused by the careless use of open lights in stables and oil shanties or other places where combustible material is stored. The short-circuiting of electric wires may cause a serious fire.

To prevent such occurrences strict regulations should be enforced in regard to throwing the fine coal and slack back in the waste, instead of loading it out of the mine. Greater care is needed in the inspection of the mine to detect the presence of accumulated gas and to reduce the dangers incident to blasting. Where conditions are particularly dangerous in this regard, every working place should be carefully inspected and competent shotfirers should be employed to charge and fire the holes. Strict regulations should also be enforced in regard to the storing of combustible matter in the mine and the use of open lights, the handling of explosives, etc. A thorough daily inspection should be made of all electric installations underground.

Ques.—What conditions would you take into consideration in reference to the work of removing pillars so as to recover the largest percentage of the seam possible, keeping in view safety and economy?

Ans.—In order to obtain the largest recovery of pillar coal, it is necessary to carefully consider the nature of the roof, floor and coal; the thickness, inclination and depth of the seam; the width of the pillars and length of time they have been standing; and, finally, the means to be employed in removing the pillars, whether this be accomplished by pick or machine. After a careful study of these conditions, a plan of extraction and system of timbering should be adopted that will provide the greatest safety to the workmen and the largest recovery of coal, with the smallest expenditure of time and money.

Ques.—What is the cause of the large number of accidents occurring in mines and what steps should be taken to avoid them?

Ans.—This a many-sided question, and the answer will be modified by the conditions existing in particular cases. In general, however, it may be stated that the chief cause of mining accidents is to be traced to the general disposition of mine workers to assume unnecessary risks and to postpone or neglect to take ordinary precautions for their own safety and that of their fellows. This disposition is largely the result of ignorance of mining conditions, the effect of which is not fully appreciated by men who have neglected to study the principles of

mining and who depend too much on their experience as miners. The largest number of accidents in mines occur at the working face and are due to the fall of roof and coal, owing to insufficient timbering.

In order to avoid the occurrence of mine accidents, it is necessary, *first*, to enforce strictly all regulations that tend to insure the safety of the worker; *second*, to maintain a constant and thorough inspection of every working place in the mine; *third*, to encourage the study of mining principles, on the part of all mine workers.

Ques.—In working a dusty mine, where marsh gas is given off, what steps would you take to guard against accidents from explosions?

Ans.—Provide for the thorough ventilation of all working places in the mine, by maintaining an ample supply of air and conducting the same in separate splits throughout the entire mine in such a manner as to cause the air to sweep the coal face in all live workings and prevent the accumulation of gas in cavities in the roof or void places and abandoned workings. Old and abandoned workings should be carefully sealed off and closely watched. Abandoned places not thus sealed should be thoroughly ventilated. The entire mine should be carefully and thoroughly examined by competent firebosses not more than two or three hours before the men go to work, each shift. The mine should be worked exclusively with safety lamps, and no open lights should be permitted to be used, except by drivers working on the main intake airways. All roads and airways in the mine should be regularly and thoroughly cleaned and a proper system for spraying the roads and humidifying the mine air should be installed and maintained in good condition. Only permissible powder should be used in blasting the coal, and all holes should be inspected, charged and fired by competent shotfirers. No more than a specified number of men should be permitted to work on the same air current. All safety lamps used by the men should be owned by the company, and these should be thoroughly inspected and cleaned at the end of each shift.

Ques.—The water gage in a certain mine reads 2 in. when the velocity of the air current is 500 ft. per min. and the length of the air course is 4000 ft. What will be the water-gage reading in this mine when the air course has been extended to 8000 ft. and the velocity of the air current increased to 800 ft. per min.?

Ans.—Assuming a single air current in each case, the pressure or the water-gage reading will vary as the length of the air course and as the square of the velocity of the current. In other words, the water-gage ratio is equal to the product of the length ratio and the square of the velocity ratio. Therefore, calling the required water gage in the second case x ,

$$\begin{aligned}\frac{x}{2} &= \frac{8000}{4000} \left(\frac{800}{500} \right)^2 = \frac{2}{1} \left(\frac{8}{5} \right)^2 \\ &= \frac{2 \times 64}{25} = 5.12\end{aligned}$$

$$x = 2 \times 5.12 = 10.24 \text{ in.}$$

Coal and Coke News

Washington, D. C.

The House of Representatives has just passed the sundry civil appropriation measure, which carries the provision for the annual expenses of the Bureau of Mines. The detail of the appropriations for the coming year is as follows:

For general expenses, including pay of the director and necessary assistants, clerks and other employees in the office at Washington, D. C., and in the field, to be expended under the direction of the Secretary of the Interior, \$70,000;

For investigation as to the causes of mine explosions, methods of mining, especially in relation to the safety of miners, the appliances best adapted to prevent accidents, the possible improvement of conditions under which mining operations are carried on, the use of explosives and electricity, the prevention of accidents, and other inquiries and technologic investigations pertinent to the mining industry, \$347,000;

For investigation of mineral fuels and unfinished mineral products belonging to or for the use of the United States, with a view to their most efficient mining, preparation, treatment, and use, including personal services in the bureau at Washington, D. C., not in excess of the number and total compensation of those so employed during the fiscal year 1913, \$135,000;

For inquiries and scientific and technologic investigations concerning the mining, preparation, treatment, and utilization of ores and other mineral substances, with a view to improving health conditions and increasing safety, efficiency, economic development, and conserving resources through the prevention of waste in the mining, quarrying, metallurgical, and other mineral industries; to inquire into the economic conditions affecting these industries: Provided, That no part thereof may be used for investigation in behalf of any private party, nor shall any part thereof be used for work authorized or required by law to be done and that is being done by any other branch of the public service, \$100,000;

Not exceeding 20 per cent. of the foregoing sum and not exceeding 10 per cent. of the sum for investigation as to causes of mine explosions may be used during the fiscal year 1916 for personal services in the District of Columbia; and for the fiscal year 1917, and annually thereafter, estimates shall be submitted specifically for all personal services required permanently and entirely in the Bureau of Mines at Washington, D. C., and previously paid from lump-sum or general appropriations;

For inquiries and investigations concerning the mining, preparation, treatment, and utilization of petroleum and natural gas, with a view to economic development, and conserving resources through the prevention of waste; to inquire into the economic conditions affecting the industry, \$35,000;

For equipment and extension of mine rescue station at Birmingham, Alabama, \$3000;

For repairs to mine rescue station at McAlester, Oklahoma, \$500;

Toward dismantling and removal of the plant of the Pittsburgh Mining Experiment Station and installation in the new buildings in Pittsburgh constructed under the authority contained in section 26 of the public buildings act, approved Mar. 4, 1913, including the employment of necessary labor; machinery, appliances, materials and supplies, furniture and office equipment, cases for apparatus, shades, awnings, and all other articles made necessary by such removal to fully equip and furnish these new buildings for laboratory and office purposes, \$57,300;

For one mine inspector for duty in Alaska, \$3000;

For per diem, subject to such rules and regulations as the Secretary of the Interior may prescribe, in lieu of subsistence at a rate not exceeding \$5 when absent on official business from his designated headquarters, and for actual necessary traveling expenses of said inspector, \$2500;

For clerk to mine inspector of Alaska, \$1500;

For technical and scientific books and publications and books of reference, \$1500;

For purchase or lease of necessary land, where and under such conditions as the Secretary of the Interior may direct, for the headquarters of mine rescue cars and construction of necessary railway sidings on the same, \$1000: Provided, That the Secretary of the Interior is authorized to accept any suitable land or lands that may be donated for said purpose;

Persons employed during the fiscal year 1916 in field work, outside of the District of Columbia, under the Bureau of Mines, may be detailed temporarily for service in Washington, D. C., for purposes of preparing results of their field work; all persons so detailed shall be paid in addition to their regular compensation only their actual traveling expenses or per diem in lieu of subsistence in going to and returning therefrom: Provided, That nothing herein shall prevent the payment to employees of the Bureau of Mines their necessary expenses or per diem, in lieu of subsistence while on temporary detail in Washington, D. C., for purposes only of consultation or investigations on behalf of the United States. In all, Bureau of Mines, \$757,300.

HARRISBURG, PENN.

The bill (No. 160), introduced on Feb. 8, by Senator Catlin, to put the miners in line for the benefits to be reaped from the proposed workmen's compensation act, was reported out of the mines and mining committee of the Senate on Feb. 9, and by unanimous consent passed first reading. This is the most rapid progress of a mining bill in the Senate in 30 years.

The Catlin measure marks the opening of the fight to secure general remedial legislation for the anthracite miners during the present session of the Legislature.

The bill calls for several important changes in the hard coal mine code of 1891. The suggested changes deal exclusively with the health and safety of the men employed in and about the mines. The miners' lobbyists here say that any operator who has the interest of the employees at stake, cannot consistently oppose the bill. They affirm it will give the operators a splendid opportunity to let the public know whether their "Safety First" movement is sincere.

The bill also provides that before any one shall receive a mine foreman's certificate he must have had at least five years' practical experience in an anthracite mine of this Commonwealth as a miner cutting or blasting coal at the face. Several changes in the duties of a mine foreman are also suggested, and the method of hoisting and lowering men is also touched, and the duties of the hoisting engineer and the hours to be worked have been covered. It is also provided that no one shall blast coal or rock unless he possess a miner's certificate, and no machinery operated by steam, gasoline or oil using fire to generate its power shall be operated inside the mine.

Should the bill of Representative Ramsey repealing the anthracite coal tax pass the Legislature, the anthracite operators would probably be enriched by at least \$6,000,000.

This bill merely cites the act of 1913 and adds "is hereby repealed." No provision is made for the return to the people of the money collected by the coal dealers. Just how this plan could be worked out in case the act should be repealed, or in case after the pending suit to test the constitutionality of the act it is decided to be unconstitutional, has never been suggested.

Members of the Legislature who have been looking for additional means of increasing state revenues, it is believed, will not favor the repeal of the anthracite tax; rather they favor the imposition of a similar tax on bituminous coal, oil and natural gas. Such a tax would find more popular favor than the proposed tax on real estate.

A general act including all of these natural resources as well as coal, it is said, could not be attacked as unconstitutional with the same plausibility as shown in the litigation over the anthracite coal tax recently heard in the Dauphin County Court. There it was claimed the tax was class legislation.

Governor Brumbaugh declared on Feb. 13, that he did not see any reason why the Rooney Act of 1913, placing the coal tax should be repealed.

"Why should it be repealed? There is every reason why it should not be repealed now that the question of the constitutionality of the act is in the courts" he said. "If the act is held unconstitutional there would be no need of a repeal because that would end it. The act ought to remain until the court has passed upon it. In my address I said that a reasonable tax could be placed on our great natural resources as they flow to the markets and that they should be made to bear their part of the burden. But this act is before the courts so why should it be repealed?"

PENNSYLVANIA

Anthracite

Pittston—An explosion of gas occurred Feb. 8 at the No. 9 Colliery, Pennsylvania Coal Co., resulting in the serious burning of three men. These men were putting up brattice when they ignited a pocket of gas in the Marcy vein near No. 3 Shaft. It is believed that all will recover.

Scranton—The Hyde Park and Brisbin collieries of the Delaware, Lackawanna & Western Coal Co. were recently ordered closed for 10 days during which time repairs will be made. The Hyde Park colliery employs 800 men, and the Brisbin 600 men. It has not yet been decided whether or not steel cages will be put in the shafts during the idle period.

Bituminous

Pittsburgh—The U. S. Bureau of Mines is coöperating with the City of Pittsburgh in an attempt to determine the causes of sewer explosions. Special methods and apparatus have been devised, and samples of sewer air are being tested.

The work is under the supervision of G. A. Burrell, chief gas chemist of the Bureau of Mines, and H. C. Boyd, chemist of the City of Pittsburgh.

Greensburg—The Donohoe Coke Co. and John P. Donohoe & Co., Ltd., are attempting to organize a temperance society among employees and get them to sign a total abstinence pledge for a period of one year. Only employees of the company 18 years of age or over are eligible, and an application for a charter for the Greenwald Temperance Society has been presented to the Common Pleas Court.

Uniontown—Receivers for the Tower Hill Coal & Coke Co., announced recently that Tower Hill No. 1 has been ordered fired up immediately, affording employment to over 300 men. The Republic Iron & Steel Co. at Martin has also started 240 additional ovens.

Connellsville—Orders have been issued by the H. C. Frick Coke Co. for firing 515 additional ovens, making a total of 855 for the past week, and 3355 for two weeks. Orders have also been issued for all plants to run five days per week. Production and shipments throughout the Connellsville region now average over 250,000 tons weekly. With the resumption of work at the coke plants, Mayor Marrietta has given orders to discontinue the bread line at the Connellsville City Hall. Every morning since the first of the year, some 20 to 40 persons have been fed free rolls, soup and hot coffee. It is believed that some have presumed upon the generosity of the municipality.

WEST VIRGINIA

Boomer—Mines at this place will shortly go on full time, as there has been a marked improvement in coal production on Cabin Creek.

Carlisle—Charged with violating the mine laws, William Pilkington, mine foreman, and Firebosses Romeo Campi and John H. Rowley were arrested recently at the instance of Earl Henry, chief of the Department of Mines. The specific charge against Pilkington is that in his official capacity he violated the provision of the statute requiring break-throughs at intervals of 80 ft. The firebosses are alleged to have been negligent in failing to place danger signals on the outside of the mine after discovering gas in the entry where the explosion took place.

Huntington—Coal is already being taken from the new mines of the Pursglove-Maher Coal Co., of Cleveland, Ohio, which began opening mines in Logan County following the strike in eastern Ohio, where the company was working several mines. It is expected that shipments will begin within 60 days, and that developments will be made upon a large scale.

Morgantown—The West Virginia Mining Institute through its newly elected president and vice-presidents is making a vigorous effort to increase the interest of all mining men of the state in its behalf. In their circular letter to this end the officers express themselves as desirous of increasing the membership to 1000 and as an inducement are offering the proceedings of the institute in five volumes from 1908 to 1912 inclusive at the extremely low price of \$3 complete.

Charleston—Governor Hatfield is strongly advocating to his legislature which is now in session, the enactment of legislation concerning the conservation of the natural resources of the state. The Governor claims that 200,000 acres of valuable coal lands have been destroyed by prospectors for natural gas and oil, also that 500,000 cu.ft. of gas is going to waste every day.

VIRGINIA

Lynchburg—The Virginia-West Virginia Coal Co., of Charleston, W. Va., has filed suit in the Federal Court here for the possession of 146,000 acres of coal and timber land in Buchanan County, Va., the defendants being the Clinchfield Coal Co., the Big Sandy Fuel Co., the Ritter Lumber Co., the Virginia Mining & Mfg. Co., the Big Sandy & Cumberland Ry. Co., and the Dominion Coal Co. This is the fifth suit filed recently involving Buchanan County lands, and it is understood that others are to follow.

ALABAMA

Montgomery—The movement to take the state convicts from the lease system was started in the Legislature Feb. 13, when Representative Davis introduced a bill in the Lower House prohibiting the working of state and county convicts in any mine, turpentine camp, lumber mill or other private enterprise, and providing penalties for each conviction.

TENNESSEE

Jellico—A coöperative mine rescue station will be instituted at Jellico by the coal operators and the U. S. Bureau of Mines. Apparatus will be loaned from the Knoxville

station of the Mine Bureau, and the men who work in the station will be remunerated under a law of the state allowing appropriations for mine rescue work. Operators will be reimbursed for their outlay in the same manner.

KENTUCKY

St. Charles—The Carbondale mines, two miles north of here, have resumed operations after a long shut-down, with 65 negroes and a few of the old employees. These were among the mines which were visited earlier in the winter by "Possum Hunters." On the first visit three white men and one white woman were injured and on the second the negroes were lined up and told to leave the country. One negro boy was killed.

OHIO

Salem—The New Waterford Mining Co., which was recently organized with a capital of \$50,000 will soon start a shaft at the northern edge of New Waterford for the purpose of developing a large bed of coal. It is expected that 300 miners will be employed.

Columbus—Arrangements were made for an open hearing Feb. 17 on the bill of Senator Gallagher, pending in the Ohio legislature seeking to amend the Green antiscreen law in Ohio to permit miners and operators to agree upon a wage scale on either the mine-run or the screen basis. The bill was introduced at the instance of eastern Ohio operators, who believe that the passage of the amendment will end the strike which has been going on in that field for more than 10 months. It is said that operators in the Hocking Valley, Cambridge, Massillon and Jackson fields, where the wage agreement has been signed, will oppose the passage of the amendment.

Rendville—An early resumption of operations at the Sunday Creek Coal Co.'s mine No. 268, at this place, is reported to have been decided upon, and the men are anxious to go to work, as they have had only six weeks' work since April of last year.

INDIANA

Indianapolis—The shotfirers' bill which was killed in the Senate of the Legislature in 1913 was introduced again at the present session, and has passed the house without a dissenting vote. It provides that the mine operators shall employ and pay the shotfirers.

A bill has been introduced to establish a department of mining engineering at Purdue and Indiana Universities; also a bill to regulate the use of black powder in coal mines and providing penalties for misbranding black powder to be used in blasting.

Terre Haute—Over 300 miners recently went on strike at the Shirkie mine, one of the most active in the state, because of their contention that the contract required the laying of track in the middle of the room and that it was laid at the side.

Sullivan—The Chicago-Carlisle Coal Co.'s mine at Carlisle has been equipped with electric motors.

ILLINOIS

Belleville—There will be a hearing shortly at Springfield, Ill., before the Public Utilities Commission, on a petition presented by citizens of Belleville and operators in the Standard field, to reduce the freight rate on coal from certain mines in the 5th and 9th districts and within a certain radius of East St. Louis, from 32c. to 20c. per ton. This will doubtless stir up much trouble and confusion, and will likely cause a separation of the operating interests in the field. The intention in the beginning was to ask the Commission to put into effect a rate of 10c. per ton, a nominal switching rate, on coal moving off of what are known as the industrial roads; that is, roads owned and controlled by mining interests and used for the purpose of hauling coal only. Ten cents a ton, it is contended, will pay the transportation on the coal and will prohibit the operators from selling coal at 20c. below the cost of production and losing on the coal what they are enabled to make up on the transportation. It is likely that the Commission will not take any decided steps for some time until the matter has been thoroughly investigated.

Harrisburg—Orders to close for an indefinite time mines 14 and 15 of the O'Gara Coal Co. were recently received here. All tools have been removed. The only reason assigned for the shutdown is the poor market conditions. Over 700 men will be idle from these two mines.

Cartersville—Wm. Bauman has filed a petition in bankruptcy with liabilities of \$31,500, all unsecured, and assets of \$150. Coal-mining ventures that proved failures were given as the cause. The creditors are banks that hold notes.

South Bartonville—An explosion occurred in the mine of the Collier Coal Co. on Feb. 10, resulting in the death of one man and in serious injury to at least one other. Sixty men were working on the night shift, but it is believed that practically all of these escaped uninjured.

FOREIGN NEWS

London, England—A strike of the Yorkshire coal miners which had been feared was avoided when the mine owners conceded the men's demand for an advance in wages until the end of the war. The dispute involved 50,000 men and arose over the interpretation of a minimum wage award.

Essen, Germany—It is reported that coal-mine operators have reached an agreement with the military authorities whereby the former are to be supplied with prisoners of war for the purpose of working the mines.

PERSONALS

Frank L. Speakman, of Wilmington, Del., has been appointed Trustee in Bankruptcy for the Elliott-Chapman Coal & Coke Co., a Delaware corporation doing business in Alabama.

John P. White, Frank J. Hayes, and William Green, president, vice-president, and secretary-treasurer of the United Mine Workers of America, were all recently reelected for a term of two years.

J. W. Miller, formerly connected with the Central West Coal Co., has taken a position with the Columbus office of the Elk River Lumber & Coal Co. of which C. M. Anderson is Western sales manager.

James R. Caseley, who has been general manager of the Buffalo & Susquehanna Coal Co. for several years, was recently elected president and general manager of the firm as well as to a directorship.

Thomas Moses has been appointed general superintendent of the Bunsen mines as a successor to Clay Lynch, who resigned recently to become vice-president and general superintendent of the H. C. Frick Coke Co. at Pittsburgh.

Col. J. C. Maben, president, and W. H. Goadby, chairman of the board of directors of the Sloss-Sheffield Steel & Iron Co., both of New York, were recently in Birmingham making the semiannual inspection of the physical properties of the company.

Edward R. Clayton, formerly of Grafton, W. Va., and well known as an operator at Fairmount, W. Va., and also in the Eastern part of the country in the coal trade, has joined the Sneed & Meguire Coal Co., at Louisville, Ky., as manager of sales.

James Hillhouse, former state mine inspector of Alabama, left Birmingham recently for Rochester, Minn., to undergo treatment by a specialist. Mr. Hillhouse's condition has been apparently fairly good and it is hoped that when he returns home, he will be free from suffering.

E. C. Mahan, of Knoxville, Tenn., treasurer and general manager of the Southern Coal & Coke Co. and of the Southern Mining Co., left recently for a vacation of a month in Florida with his wife and daughter who are there recuperating from serious attacks of typhoid fever.

Frank R. Clark, of the U. S. Geological Survey, has been assigned by the Federal bureau to work in the Cumberland plateau coal field of Tennessee and will begin his work of collecting samples at once, expecting to spend three months or more on the work. The samples will be analyzed at the U. S. Bureau of Mines at Pittsburgh.

J. M. Roan, chief mine inspector and safety superintendent of Ohio, has asked for an appropriation of \$3000 to push his safety campaign in Ohio. His plan is to organize the state into districts for the purpose of demonstrating the use of the safety equipment of the rescue car which was purchased by the department last year. The appropriation is to be used to pay the railroads for transporting the car as all other work will be done by the deputy inspectors which are under state pay. He plans to visit all mining camps and show the use of the helmets and demonstrate first aid.

A. B. Saurman, for the past 12 years Pacific Coast manager for the Standard Underground Cable Co., has been appointed Southeastern manager of the company (succeeding the late

T. E. Hughes) with headquarters in his native city, Philadelphia, Penn., and will return East in the early spring. He became associated with the company in Philadelphia in 1893 and after two and a half years in the construction department was transferred to the eastern sales department at New York City, leaving the position of assistant manager there in 1900, when he organized, and was manager of, the northeastern sales department with headquarters at Boston, until transferred to San Francisco as manager of the company's interests there in the fall of 1902. John P. Bell will succeed Mr. Saurman as Pacific Coast manager.

OBITUARY

Peter Klitch, 50 years old, outside superintendent of the new Locust Mountain Coal Co., Shenandoah, Penn., was caught in the machinery on Feb. 11, and instantly killed. He was one of the best known mining men of the region, a patentee of note and was formerly with the Lehigh Valley Coal Co. for 20 years. A widow and 10 children survive him.

William Dick, an independent mine owner of Colorado, was shot and killed by two highwaymen, while driving his automobile in the La Veta road, five miles west of Walsenburg, Colo., Feb. 13. Mr. Dick had \$10,000 with him, \$6500 of which was undiscovered by the highwaymen and left in the machine. The money was to pay off the miners of the Oak View mine. Mr. Dick was interested in many mining projects in Colorado and was president of the Pinon Supply Co. and of the Walsenburg Wholesale Mercantile Co. He leaves a wife and 8 children.

John G. Massie, aged 67, a pioneer coal operator in the southern Illinois field, recently died at St. Elizabeth's Hospital in Belleville, Ill. Until last December he was a resident of Chicago. He was a third descendant of Major Thomas Massie, a member of Gen. Washington's staff during the Revolutionary war. Mr. Massie has been credited with the discovery of the coal seams of Alabama previous to 1879.

Born near Logan Courthouse, Va., in 1847, he enlisted in the Union army at 18 and served throughout the war. He later studied civil engineering, and specialized in mine work. At the request of the British government in 1898 he went to Australia to demonstrate American methods of mine ventilation. He was one of the first to work out the third-entry ventilation system, and had invented and patented over 50 appliances for the mining industry. Besides a widow in Denver, and a brother in Parkersburg, W. Va., seven children survive him. Burial was in Belleville.

CONSTRUCTION NEWS

Barnesboro, Penn.—The Watkins Coal Co. will shortly begin the sinking of a shaft a short distance from Bakerton.

Pineville, Ky.—The Continental Coal Corporation will develop two additional mines on Straight Creek and is reported to have purchased the mines of the Big Hill Coal Co.

Dorchester, Va.—A. H. Hopkins and others have leased a tract of coal land at Fagan, Ky., which they plan to develop. It is the intention to secure a daily production of 1000 tons.

Pittsburgh, Penn.—D. T. Riffe has been awarded a contract to build a fireproof hoisting-engine house and substation for the Pittsburgh Coal Co. at Hill's Station. This contract involves \$15,000 and calls for the completion of the work in 90 days.

Harlan, Ky.—Besides the one mile of railroad which will be built up Catron's Creek from the main line of the L. & N. to the operation which Judge Peyton Norville is to develop, there will be three or four miles of road built up Clover Fork and Yocum's Creek as soon as the weather settles. Judge Norville has leased 1056 acres from W. H. H. Smith and W. F. Hall.

Johnstown, Penn.—The Washeries of the Lackawanna Coal & Iron Co. at Wehrum, which were destroyed by fire some time ago, will not be rebuilt, but a heading will be driven to connect Mines No. 3 and 4. When completed the coal from both operations will be taken out of the shaft two miles from the town. No. 3 mine was abandoned some years ago, but a new tippie is being placed at its mouth and the old washer is being repaired.

Arden, Penn.—The Meadowlands Coal Co., whose large wooden tippie was burned during the month of December, has

contracted for a new steel tippie and complete equipment. The tippie is to be built and erected by the Penn Bridge Co., and the Fairmount Mining Machinery Co. is to install the equipment complete consisting of a double set of chutes and screens, loading boom, empty-car haul, and ram for pushing the cars on and off of the cages.

Lexington, Ky.—The Himyar Coal Corporation, operating a mine recently opened on the Lexington & Eastern branch of the Louisville & Nashville Ry., at Himyar, Ky., is opening another mine on a tract leased from the Haly Coal Co. on the First Creek Branch of the Lexington & Eastern, now under construction, in Perry County, Ky., in the Hazard field. Louis Des Cognets, of Lexington, Ky., is president of the company and W. L. Carter, of Himyar, Ky., is general superintendent.

Chattanooga, Tenn.—Construction work is progressing rapidly at the plant of the Chattanooga Gas & Coal Products Co. on East End Ave. Three large tanks, one for water, one for coal tar and one for benzol, are rising rapidly, foundations are being laid for the gas reservoirs and the concrete foundations for the ovens are in advanced stages of construction. Some of the first machinery shipments have been received. It is said that probably the Durham Coal & Iron Co.'s entire output of coking coal will be utilized when the ovens are in full operation.

Clarksburg, W. Va.—The Link Belt Co. of Philadelphia has been awarded a contract for equipping the plant of the Marshall Coal Co. at Byron with a retarding conveyor system about 600 ft. in length, which will extend from a point near the pit mouth to the railroad car tracks at the foot of the hill. The contract for the frame and concrete work in connection with this equipment has been awarded to the Consolidation Construction Co. of Shinnston, which will begin work soon. The conveyor system when completed will have a maximum capacity of 2000 tons per day. Excavations and grading for the new equipment have already been completed.

NEW INCORPORATIONS

Woodsfield, Ohio—The Ohio River Western Coal Co. has reduced its capital stock from \$3,000,000 to \$150,000.

Chattanooga, Tenn.—The Old Virginia Coal Co. has been incorporated with a capital stock of \$50,000 to develop coal mines.

Hopkinsville, Ky.—The Southern Coal Co. was recently incorporated with a capital stock of \$50,000 for the purpose of developing coal mines.

Harlan, Ky.—The Harlan Gas Coal Co. has been organized and has leased the Harlan Town mines. The incorporators are W. W. Lewis, A. B. Cornett and J. L. Williams, of Harlan.

Cincinnati, Ohio—The E. R. Carter Coal Co. has been organized with a capital of \$5000 for the purpose of operating mines and commissaries, and dealing in coal, land, timber and minerals. The incorporators are E. R. Carter, M. Geiger, F. E. Kunkel, Carl Lehmann, and C. B. Jolly.

Charleston, W. Va.—The Gauley Valley Coal & Coke Co. of Summersville was recently incorporated with a capital stock of \$500,000. The incorporators are W. L. Camden, of Mountain Lake Park, Md., J. H. Nash, Jr., J. G. Bimting and C. L. Smith of Charleston, and W. G. Reddy of Summersville.

INDUSTRIAL NEWS

Torchlight, Ky.—The Eastern Kentucky Coal Co. has been working full time all winter on coal for domestic purposes, and has just closed a contract for Lake shipments that will keep the mines working full capacity all summer.

Pittsburgh, Penn.—The tow-boats "James Moren" and "Exporter," of the Monongahela River Consolidated Coal & Coke Co., left the Pittsburgh Harbor, Feb. 15, with 22 boats and 16 barges, containing a shipment of coal aggregating 680,000 bushels.

Stonega, Va.—The commissary of the Stonega Coal & Coke Co. recently burned with all its contents. For a time the whole town was threatened. The loss to the coal company is estimated at \$75,000, a large part of which is covered by insurance.

Seacoal, Ky.—Seacoal will be the name of the town in Letcher County where the mines of the Southeast Kentucky Coal Co. will be located. Henry La Viers, general manager,

is now on the grounds participating in the development work. This company is closely allied with the Northeast Coal Co., of Paintsville, Ky.

Newport News, Va.—A total of 886,435 tons of coal were dumped over the Hampton Roads coal piers at Lambert's Point, Sewall's Point, and Newport News, during the month of January. These figures show an increase of 54,578 tons over the preceding month of December, when dumpings amounted to 831,948 tons.

Seranton, Penn.—Anthracite shipments during January totaled 4,831,329 tons as compared with 5,280,644 tons for the corresponding month in 1914. The Lehigh Valley R.R. led with 954,072 tons. The Reading followed with 750,757 tons. The Delaware & Hudson ranked third with 623,947 tons, and the Jersey Central fourth with 608,296 tons.

Washington, D. C.—It has been learned from the Interstate Commerce Commission that a decision in the so-called anthracite coal case involving rates from anthracite coal districts in Pennsylvania to tidewater would not be settled before the Commission takes its summer recess. It is probable that the decision will not be rendered until some time this fall.

Knoxville, Tenn.—In order to prevent, or at least try to prevent ruinous competition, the Southern Appalachian Coal Operators' Association, comprising a large number of the operators in eastern Kentucky and Tennessee, is preparing to take up with the United States Department of Justice the question of the legality of entering into an arrangement to restrict the output of the mines.

London, England—Among the concessions to the German bankers, in return for the loan to Bulgaria, is the right to exploit the Pernik coal mine, the richest in Bulgaria. The fuel is lignite, possibly of Miocene Age, having about the following composition: Fixed carbon, 40 per cent.; volatile matter, 37 per cent.; ash, 7 per cent. of which 2 per cent. is sulphur. The moisture content is about 16 per cent. There are four beds, one of which is about 11 ft. thick.

Knoxville, Tenn.—The last spike in the Clinchfield Railway extension from Dante, Va., to Elkhorn City, Ky., was recently driven, just north of the Sandy Ridge tunnel, nearly 8000 ft. in length, by George L. Carter, who conceived the Clinchfield route. This road, connecting with the Chesapeake & Ohio at Elkhorn City, forms a direct line between the Ohio Valley and Central West to the South Atlantic States and opens up a rich coal section. Regular service will begin in the near future.

Bluefield, W. Va.—Successful tests have been made of the giant electric locomotives, weighing 270 tons each, and with sufficient power to move a 250-car train on the level, installed on the Elkhorn division of the Norfolk & Western. A pair of these locomotives, one at each end of the test train, moved a train of coal cars aggregating 4000 tons in weight, on a 2 per cent. grade. Tests in braking down the grade were also successful. The section electrified handles from 50,000 to 100,000 tons of coal a day.

Columbus, Ohio—Figures in support of the complaint that the railroads are charging higher rates for the transportation of Ohio coal than for West Virginia coal were submitted to Governor Willis recently by a committee representing the United Mine Workers of Ohio, which has united with Ohio operators to secure the passage of a bill to prevent such alleged discrimination. The figures submitted showed that West Virginia coal is being hauled across the state to Lake ports at 36.9c. per ton, while 75c. is being charged for hauling Ohio coal over the same route. The committee told the chief executive that the railroads charge on an average 103 per cent. more for hauling Ohio coal than for the West Virginia product.

St. Louis, Mo.—Notwithstanding the general business depression during the past fall and early winter, the Broderick & Bascom Rope Co., St. Louis, New York and Seattle, manufacturers of Yellow Strand Powersteel wire rope, arranged matters so that every man and boy on its pay rolls had work. The company decided it was best to employ all its force, even if only part time rather than to work one-half of the force full time. Last spring, the big St. Louis plant was running full force; at least 85 per cent. of its full time. Later in the year, it operated three-fourths time, but kept the entire day and night force. Finally, during part of October and all of November, it ran one-half time—still keeping all the men employed. During December, the plant operated full time, day and night—even though that meant piling up large stocks of wire rope. This resulted in no little expense, increasing stock several million pounds. The mayor of St. Louis and the president of the St. Louis Business Men's League, on Dec. 23, 1914, wrote to all St. Louis manufacturers, urging them to do just what this firm had voluntarily done for months—that is, keep all their employees working, even if only part time.

Coal Trade Reviews

General Review

Anthracite production still heavily curtailed and storage facilities of the companies choked full of coal. Bituminous buyers in control of the market and showing no anxiety regarding supplies. Preliminary forecasts on the Lake trade discouraging. No indications of any improvement in the Middle West.

As a result of the generally mild weather, and the generally curtailed consumption, the storage facilities of the large hard-coalers are choked up with coal, and operations are heavily curtailed. Circular prices are being obtained only on the very best grades, while discounts down to the full April schedule are already being noted. There are superabundant supplies in every direction so that the buyer is generally in control and becoming exceedingly critical as to quality. Old and conservative members of the trade regard the situation as the least favorable for this period of the year in their recollection. There are even rumors that some of the large companies are making concessions on the regular circulars.

The bituminous situation continues as discouraging as ever. With the exception of the movement on contracts, there has been practically nothing doing at all in the coal market, and with the textile and other mills working under heavily curtailed schedules, stocks will last considerably further into the season than usual. Still new high records are being noted on ocean freights, which is confusing the off-shore trade, and it is extremely difficult to interest steamship owners in coal. Buyers are showing no anxiety whatever regarding supplies, and the wide range in bids on recent large government contracts show how uneven the situation is.

The domestic demand in the Pittsburgh district continues fair, and a very slight improvement is noted in railroad orders which, if continued, will stimulate a greater activity all along the line. At the moment prices are still being cut, while buyers are showing no disposition to come into the market, and the situation is as irregular as ever. The outlook for the Lake trade is also discouraging; reports from the head of the Lakes indicate that large tonnages will be carried over, and so far it has not been possible to interest Lake buyers in the market.

The higher temperatures have caused a further slump in the Ohio market, many orders for delivery over the last part of the current month having been canceled. New buying has ceased almost completely, what little there is being generally irregular and confined to small orders. There is considerable distress coal on consignment which can only be moved by forced sales, usually at heavy sacrifices. Steam coals in the Southern market show a slight improvement, though prices continue irregular on all grades with the buyer in full control of the situation; as a result of the uniformly low prices prevailing throughout the past year, operators are anticipating considerable difficulty in renewing the old contracts.

Some of the high-grade operations in the Middle Western field have been forced to suspend operations for the first time this season. The railroads are taking far below their customary tonnage, and the persistent reports of a general industrial revival are contradicted with great positiveness by some of the best informed operators in Illinois and Indiana. Prices on the domestic grades are at the summer level, and the outlook is regarded as discouraging.

ATLANTIC SEABOARD

BOSTON

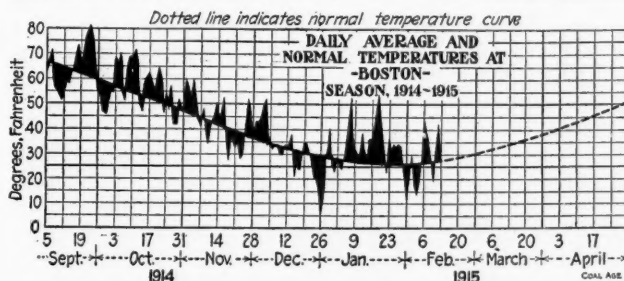
Pocahontas and New River situation makes no special progress. Buyers more disposed to wait. Georges Creek shippers make no move as yet on delivered prices. Pennsylvania grades in somewhat better demand. Anthracite dull.

Bituminous—The week has developed no buying of any consequence aside from the contracts placed earlier in the month and in January. As the latter are almost altogether in the same channels as last year there is practically a deadlock in the Hampton Roads coals in this market. The shippers

with transportation under control have taken on about all the business that could be closed at an advance over last year but there are a great many consumers and dealers who now feel they can lose nothing by waiting. They are encouraged in this by those agencies that are dependent on boats in the open market.

The recent bids for supplying the Navy Yard at Portsmouth, N. H., show how uneven are current prices delivered. The bids ranged from \$3.65 for New River to \$4.15 on Georges Creek, a difference of 50c. on coals that are normally competitive. What contracts have lately been closed either alongside or on cars have been at a very small advance over last year.

The spot market at distributing points has eased off again. Prices are still near to \$4 for small lots on cars. The demand for contract requirements is fairly strong. A few plants that would otherwise be forced into the market soon after Apr. 1 are accepting liberal shipments on 1914 arrangements.



There is nothing new on the Georges Creek grades. The shippers are still withholding any announcement of their attitude toward delivered prices. The largest interest in this field has a fleet of its own but is pursuing a waiting policy.

The better grades of Pennsylvania coals are being represented in every open competition. Several of the shippers are making a vigorous canvass of the territory both all-rail and at tide and it is hard to see how they can fail to increase their tonnage.

Water Freights continue at \$1, but with plenty of bottoms offering. The number of sailing vessels chartered off-shore has, however, so reduced the amount of available tonnage that owners are in a very independent position. At the same time it is problematical whether there will be any advance from the present level, inquiry is so likely to drag the next three months.

Anthracite shows no relief from the dullness last reported. Individual coals are beginning to appear, notwithstanding the rates asked on barges from New York. Cargoes have even appeared from Philadelphia and, it is generally understood, at prices well down to the usual April circular. The curtailment at the mines is so rigid that spot orders for fresh-mined sizes like pea are accepted only subject to delay.

Wholesale prices on bituminous are about as follows:

	Clearfields	Cambria Somerset	Georges Creek	Pocahontas New River
Mines*	\$0.90@1.50	\$1.15@1.65	\$1.67@1.77	
Philadelphia*	2.15@2.75	2.40@2.90	2.92@3.02	
New York*	2.45@3.05	2.70@3.20	3.22@3.32	
Baltimore*			2.85@2.95	
Hampton Roads*				\$2.70@2.75
Boston†				3.85@3.95
Providence†				3.68@3.83

* F.o.b.

† On cars.

NEW YORK

Embargoes cleared up and inquiries on new contracts are about normal. Prices unchanged. Superabundance of anthracite and the market heavy with prices irregular. Storage facilities crowded.

Bituminous—There is no change of any kind noticeable in the local situation, though perhaps the agencies are becoming more generally reconciled to existing conditions in the belief that they certainly cannot become any worse so that any change must be for the better. One encouraging factor is that the numerous embargoes recently in effect at South Amboy were all removed the early part of the week with the exception of about three. It is also noted that there is about

the usual amount of inquiry on contract renewals and the agencies uniformly report that last year's prices have been obtained in every instance where contracts have been closed.

Production of one of the leading bituminous companies for the current month will be about 75%, that for the same month last year, and the output for January was about 60% of January, 1914. The Berwind-White Co. is again reported down to a three-day working schedule; there are rumors that this company has closed a large contract in Baltimore. The Consolidation Co. is said to be moving a large tonnage out of Baltimore which will presumably apply on the Italian business they recently closed.

Though there is practically no business being negotiated in the spot market with the exception of occasional forced sales of demurrage coal, the market is not quotably changed and we continue it as follows: West Virginia steam, \$2.35@2.55; fair grades, Pennsylvania, \$2.55@2.65; good grades of Pennsylvania, \$2.70@2.80; best Miller Pennsylvania, \$3.10@3.15; Georges Creek, \$3.15@3.25.

Anthracite—With the superabundance of supplies now at tidewater, buyers are becoming more critical as regards quality and frequent rejections are noted. Prices are generally more or less irregular, ranging all the way from the April to the full winter's circular. Because of the uncertain operations at the collieries, the agencies are experiencing some difficulty in meeting the demand for broken coal; the steam sizes are also occasionally reported in short supply, but the domestic grades are plentiful in all directions.

With the exception of possibly one or two favored companies, the storage facilities of all the large hard-coalers are choked up to their full capacity with coal and some of the oldest and conservative members of the local trade consider the situation as the worst for this period of the year in their experience. Mine operations are curtailed to from three to five days per week, and what little business appears in the spot market is being snapped up by the individuals at substantial discounts. Of the domestic grades, egg is probably the strongest while stove is the weakest, though curiously enough it is not being cut so liberally as some of the other sizes.

The New York hard-coal market is quotable as follows:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken.....	\$5.10	\$4.60@5.10	\$5.05	\$4.55@5.05
Egg.....	5.35	5.00@5.35	5.30	4.90@5.30
Stove.....	5.35	5.00@5.35	5.30	4.80@5.30
Chestnut.....	5.60	5.20@5.60	5.55	5.05@5.55
Pea.....	3.55	3.50@3.55	3.50	3.35@3.50
Buckwheat.....	2.80	2.70@2.80	2.50@2.75	2.35@2.75
Rice.....	2.30	2.20@2.30	2.00@2.25	1.80@2.25
Barley.....	1.80	1.70@1.80	1.75	1.45@1.75

BUFFALO

Some improvement in bituminous. Railroads buying more liberally. Iron orders increasing. Canadian tariff promises to affect business adversely. Anthracite quiet.

Bituminous—There is some report of better business. Dealers say that they get an occasional good day and they look for a further increase shortly. At the same time the volume of sales is not what it should be and it will have to increase considerably before the trade is satisfied. Some shippers report a better demand from the railroads. If this continues it will create a greater activity all along the line. It is generally believed that there will be an improvement before April.

So far nothing has been heard regarding new contracts, either pending or made. One large shipper says that he is trying to come within 5c. of last year's figures, but some of his competitors think he will have to accept something still lower.

Certain Pittsburgh bituminous leaders, who commonly announce a Buffalo price about this time are hesitating over the problem, probably not liking the idea of making a figure that is too low. Next month there will be regular city and other contracts to bid on and figures will have to be made. Canada is preparing to increase its tariffs in a general way and the move is expected to lessen the trade in that direction still further.

Quotations on bituminous remain dull on the basis of \$2.80 for Pittsburgh lump, \$2.70 for three-quarter, \$2.55 for mine-run and \$2.15 for slack. Allegheny Valley sells at 25 to 30c. lower than Pittsburgh.

Anthracite—The trade is rather quiet, with further reports of inactivity, but shippers are apparently not much disturbed. In the Lake trade there is steady movement. One shipper has loaded more than 150,000 tons into vessels and others will begin loading soon, as most of them have coal that is not needed. There is no complaint of the local trade. The weather has been favorable to handling and the buying has been steady.

PHILADELPHIA

Unseasonable weather conditions continue to retard trade in anthracite. Dealers apparently well stocked. Bituminous retains its sluggish attitude, with no appreciable change.

Anthracite—The erratic weather is playing havoc with the anthracite trade. The production has been curtailed until it is now on about a fifty per cent. basis, and even with this restriction, there is always more or less coal carried over from one week's mining to another; this of course refers to certain sizes. Buckwheat seems to be in the best demand at the present time though broken is also being consumed in about normal quantities. Egg and stove are difficult to move and sales are being made at the April circular or even less, in some cases; in fact about all the domestic sizes are in this same condition. It is rumored that even some of the large individual operators are making substantial concessions. The dealers continue well intrenched in the matter of supplies, and they are making every effort to dispose of these, prior to the first of April but with poor success.

Prices at Tidewater rule about as follows:

	Circular	Individuals
Broken.....	\$4.75	\$4.50
Egg.....	5.00	4.80@4.90
Stove.....	5.00	5.00
Chestnut.....	5.25	5.10

Bituminous—There is nothing new in the bituminous situation. Prices and demand continue on a parity with last week. Contracting still goes on, but slowly, the manufacturers evincing a disposition to delay closing up definitely for their year's supply. Fairly good prices are being secured on contract, compared with current offerings; 90c. to \$1 is still the rule for medium grades, with the better qualities 25 to 35c. higher.

OCEAN FREIGHTS

Rates still reaching to new high levels. Few coal charters being made.

The freight market is even higher than a week ago, owing to the increased demand for steamers for export grain and for Cuban sugar, both at advanced rates. The highest rate yet paid on export grain was to the West Coast of Italy, and Cuban sugar freights reached new high levels last week.

Under the circumstances it is extremely difficult to interest steamship owners in export coal, although we are chartering a few boats each week.

To	Rate	To	Rate
Havana.....	\$2.75	Guantanamo.....	\$3.25
Cardenas or Sagua.....	3.25@3.50	Demerara.....	5.50
Cienfuegos.....	3.25	Bermuda.....	3.75@4.25
Port of Spain, Trinidad..	3.25@3.50	Vera Cruz.....	3.25@3.50
St. Lucia.....	3.00@3.50	Tampico.....	3.25@3.50
St. Thomas.....	3.00@3.25	Rio.....	9.60
Barbados.....	3.25@3.50	Montevideo, Buenos	
Kingston.....	3.25	Aires or La Plata.....	9.00
Curacao.....	3.00	Mediterranean.....	10.80
Santiago.....	3.25	Valparaiso.....	7.20

Note—Rates noted in bold face type are only approximate.

W. W. Battie & Co.'s Coal Trade Freight Report.

OCEAN CHARTERS

Coal charters have been reported by the "Journal of Commerce" as follows:

Vessel	Nationality	From	To	Tons	Rate
Auchencrag	British	Baltimore or Virginia	River Plate	2539	\$9.60
Singleton Palmer		Norfolk	Rio Janeiro	2357	
John B. Biemiller		Philadelphia	Cienfuegos	858	
Charles K. Schull		Atlantic Range	Porto Rico	827	
Florence Creadick		Norfolk	Key West	657	1.25
Badminton	British	Baltimore	Buenos Ayres	2438	
Allanton	British	Baltimore	Mediterranean	2775	
Claveresk	British	Newport News	Havana	2441	
Chas. A. Campbell		Norfolk	Boston	1493	1.00
Clacique		Atlantic Range	San Francisco	4543	7.50
Thor	Norwegian	Atlantic Range	San Francisco	2889	7.00
Stanley M. Seaman		Atlantic Range	Cienfuegos	953	2.80
Lizzie M. Parsons		Atlantic Range	Cienfuegos	571	
Wm. J. Quillen		Baltimore	Mayport	575	1.05

Note—Steamers are indicated by bold face type, all others being schooners.

BALTIMORE

Market stagnant except for contract business. Prices remain weak on soft coal. Warm weather hurts anthracite.

Rains, and temperatures ranging from 40 to 60 deg., have confronted the coal men most of the past week. Except for coal moving on contract obligations, there has been little or nothing doing. In the mining districts the reports are monotonously alike in that respect.

Prices remain weak on bituminous coals. The better class of Pennsylvania line fuels were the only ones to show even a fair activity; prices on these grades ranged from \$1.20 to \$1.30, and good coals were obtainable at from \$1 to \$1.15, while low-grades were offering at 95 cents.

West Virginia gas-three-quarter was very dull, and what sales were made were at around 85c. Slack remained steady

at about 60 to 65c., mainly for the reason that the production is very light. West Virginia and Western Maryland steam coals were offering at from 80 to 90c. outside of the specialized fuels that bring fancy figures at all times.

Export movement is fair. However, charter announcements the past week were not as numerous as in the week preceding. Closings included the following:

Steamships "Auchencraig," to the River Plate; "Allatnon," to a Mediterranean port; "Badminton," to Buenos Ayres, and schooner "Charles T. Schull," to Porto Rico.

HAMPTON ROADS

Some improvement in demand. Shipments foreign and coastwise showing some increase.

Dumpings over tidewater piers for the past week have shown some improvement. Large cargoes have gone to New England ports and there has also been some movement Coastwise to Jacksonville and Savannah. Export cargoes have also been fairly large. Schooner tonnage is still being pressed into use for the export trade, several large cargoes having gone to South American and West Indian ports during the week.

The accumulation of coal on the railroad yards is somewhat reduced and with the tonnage now due it will probably be cut down even lower. One of the largest loadings expected for the coming week is the U. S. Collier "Cyclops" which will take in the neighborhood of 13,000 tons cargo and bunkers combined. The number of bunker vessels loaded last week has shown up well. One of the most talked of vessels bunkering was the S.S. "Dacia," formerly under the German flag, but now under American registry.

Vessels clearing from Hampton Roads during the week ending Feb. 12 were as follows:

From Norfolk	To	From Newport News	To
Wagama	Buenos Aires	Harald	Bridgetown, Barbadoes
Posillipo	Genoa, Italy	Antares	Havana, Cuba
Jacob M. Haskell	Rio de Janeiro, Brazil	Alice B. Phillips	San Domingo, S. D.
Hope Sherwood	Hamilton, Bermuda	Vinland	Manzanillo, Cuba
Stephen	Para & Manaus, Brazil	Leonatus	Santiago, Cuba
Winderemere	Bridgetown, Barbadoes		
Fannie Palmer	Rio de Janeiro, Brazil		

Note.—Steamers are indicated by **bold face** type, all others being schooners.

OHIO VALLEY

PITTSBURGH

Demand practically unchanged. Mining operations at 55 to 60% of nominal capacity. Lake coal shipping interests show no disposition to buy for season.

Domestic demand for coal has continued fairly good, while there has been a barely perceptible increase in manufacturing demand, the latter almost wholly on regular contracts, so that there is very little demand for free coal and the market remains as irregular as ever. While the usual quotation given as representing the market is \$1.15 for mine-run the price is more often cut than not. Mining operations for the district are at the rate of between 55 and 60% of capacity, when figured on a conservative basis. There is no doubt, however, that with an adequate supply of men and cars the district could turn out more than double the tonnage now being mined.

An outstanding feature of the situation, now that the middle of February has been passed, is the reserve exhibited by buyers of Lake coal. There is practically no business being done and operators are correspondingly depressed. The position of stocks in the northwest is presumably responsible for the apathy of the Lake shipping interests. It is understood that the stocks at Duluth and Superior on Dec. 1 were slightly in excess of six million tons and that at the rate they were reduced in December and January there would still be left over three million tons on May 1 at the opening of navigation.

We quote as the market, largely nominal: Slack, 90c. @ \$1; nut and slack, \$1.05; nut, \$1.10; mine-run, \$1.15; ¾-in., \$1.25; 1¼-in., \$1.35, per net ton at mine, Pittsburgh district.

COLUMBUS

Warmer weather of the past week had a bad influence on the trade. Domestic demand fell off and cancellations were numerous. Steam trade continues slow and the tone of the market is unfavorable.

One of the worst slumps of the winter has taken place in the local trade, due to higher temperatures. Buying on the part of retailers ceased almost completely and many orders for delivery the latter part of February were canceled. On the whole the market is now a weather proposition entirely

and with sudden warm spells the slumps can be expected at any time. All branches of the industry suffered and operators are now looking anxiously for the opening of the Lake trade to relieve the softness in the market.

Retail stocks are apparently sufficient for the present; buying on the part of consumers is not steady and only small orders are booked. The fancy grades such as Pocahontas and West Virginia splints are in fair demand. Hocking lump is also moving fairly well. Retail prices are rather firm at former levels, but the expected advance has failed to materialize and all hopes for higher prices have been abandoned.

Anthracite is selling fairly well in central Ohio territory and prices are firm at the following levels: Chestnut, \$8; egg, \$7.75; grate, \$7.50.

Steam business is slow all along the line. Manufacturing plants are only buying what they need for the present and are loath to accumulate stocks. Demurrage coal is being offered at very low figures. Quite a few contracts are expiring and some difficulty is experienced in renewing them. In general the steam trade is demoralized and little improvement is expected before the revival of the iron and steel business.

Pomeroy Bend district, which was flooded by high waters in the Ohio, has partially resumed and the output is estimated at 65% of normal. In the Hocking Valley, Crooksville and Jackson the output is below 50% normal.

Prices in the Ohio fields are:

	Hocking Valley	Pomeroy	Kanawha
Rescreened lump.....	\$1.50	\$1.50	.....
Inch and a quarter.....	1.35	1.40	\$1.35
Three-quarter inch.....	1.30	1.30	1.30
Nut.....	1.15	1.25	1.15
Mine-run.....	1.05	1.10	1.05
Nut, sea and slack.....	0.60	0.65	0.55
Coarse slack.....	0.50	0.55	0.45

CLEVELAND

The coal market is extremely dull and barely holding to quotations. Retail trade very quiet because of spring-like weather.

Coal receipts over Sunday were in the neighborhood of 250 cars and only about 75 cars were carried over from the week before, yet there was general complaint that there was no market. The week of Feb. 8, receipts were very light for this time of the year on account of mines being flooded by the heavy thaw but even with this the demand was no more than equal to receipts.

Of the 157 cars received by the Pennsylvania there were about 30 cars of three-quarter No. 8 coal from West Virginia on consignment; this has been selling at \$1.80 to \$1.85 a ton on track here or from 20 to 25c. below the nominal market. Slack holds to \$1.65 to \$1.70 for the better grades, merely because cutting prices would not increase the demand.

Natural gas, which is being produced in enormous quantities in northern Ohio, is cutting more deeply into the coal business than ever. The peak of the load on the Cleveland gas mains during January is reported to have been 150,000,000 cu. ft. a day, with an average of more than 100,000,000 ft. a day. It is estimated that 15,000 ft. of gas is equal to one ton of fine coal and 20,000 ft. to high-grade lump. These figures mean that gas replaced close to 5000 tons of coal a day in Cleveland. More manufacturing plants are using gas today than ever before, and though business is better the coal industry is not getting its full proportion of the improvement.

Some of the railroads are still using coal laid on the ground almost a year ago as a protection against a shortage following the suspension of mining Apr. 1, 1914. The consumption of this coal has also narrowed the market temporarily.

Conditions in Cleveland are as dull as would be expected in mid-summer when business is normal.

The market continues quotable as follows:

	Pocahontas	Youghiogheny	Bergholz	Fairmont	W. Va. No. 8
Lump.....	\$3.60	.....	.....	.....	.....
Lump, 6 in.....	.....	.....	\$2.35	.....	.....
Lump, 1½ in.....	.....	.....	2.20	\$1.95	.....
Lump, 1¼ in.....	.....	\$2.35	.....	.....	.....
Lump, 1 in.....	.....	2.25	2.10	1.90	\$2.05
Egg.....	3.60	.....	.....	.....	.....
Egg, 6 in.....	.....	.....	2.00	.....	.....
Mine run.....	2.60	2.15	1.90	1.85	1.95
Slack.....	.....	1.80	1.75	1.70	1.75

CINCINNATI

A dragging market and a failure to limit production have thrown much distress coal on the market, very low prices resulting. Only a hand-to-mouth demand in evidence, due to the lateness of the season.

A characteristic early-spring situation prevails if the existing industrial depression be regarded as the normal thing. With the end of the winter rapidly approaching, buying is

confined to the smallest possible quantities, to avoid carrying over any surplus. Notwithstanding this, heavy shipments are coming in on consignment, and eventually finding their way to the bargain counter. As low as 75c. for mine-run is reported for this distress coal, and possibly less has been accepted. If reports can be believed, no such concessions are made at the mines, although the normal price of \$1 to \$1.10 is by no means maintained.

TOLEDO

Trade continues quiet though indications are promising.

There is little activity in the trade and what business there is comes largely as the result of hard work. The domestic trade is slow and mild weather has accentuated the heaviness. Steam business is picking up very slowly and the railroads are not using anything like their usual quota of fuel.

COKE

CONNELLSVILLE

Market stagnant as to new transactions, but increased consumption by steel interests and furnaces already under contract.

The Connellsville coke market continues absolutely stagnant, there being no fresh demand from any quarter. Consumption by the producer-consumer class has increased very materially, as most of the steel works have been blowing in additional furnaces. Shipments on contracts are also increasing. The Youngstown Sheet & Tube Co. will blow in a third stack towards the close of the month, the coke to come on a contract already made for the year. The Alan Wood Iron & Steel Co., Philadelphia, is blowing in one of its furnaces this week, contracts having been made for the coke some time ago. We quote: Prompt furnace, \$1.50@1.60; contract furnace, nominal, \$1.75; prompt foundry \$2@2.35; contract foundry, nominal, \$2.20@2.30, per net ton at ovens.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ended Feb. 6 at 256,358 tons, an increase of 13,750 tons, and shipments at 247,847 tons, an increase of 7607 tons. Until the middle of January the tonnages had been running about 210,000 tons a week.

Buffalo—There is report of a better movement of coke at Connellsville, but the increased orders do not appear to have come from this section. The iron trade has not improved to any extent. If the European orders continue to come they alone will do something for the trade. Quotations remain on the basis of \$4.25 for best 72-hr. Connellsville foundry and \$3.30 for stock coke.

Columbus, Ohio—Some coke is selling and there appears to be a better demand than formerly.

St. Louis—The local foundry coke situation is extremely weak, with few inquiries.

Chicago—There is still fair buying in domestic coke, and prices are firm. Not much change is to be reported in furnace and foundry coke; some say that conditions are a little better for these grades, but the improvement has not made itself felt in prices. Prices are as follows: Byproduct, \$4.60@4.95; Connellsville, \$4.65@4.80; Wise County 72-hr. (select), \$4.60@4.75; gas coke, \$4@4.25.

THE STEEL INDUSTRY

The recent slight improvement well sustained and the trade is optimistic. Spectacular advance in galvanized pipe. Pig iron unchanged but looking up.

Tendencies in the next few weeks in finished-steel prices will have an important bearing on betterment in general. The creeping improvement in volume is being sustained, and in spite of the small part contributed by the railroads, and, in fact, because of it, the trade is optimistic of the future. It seems clear that the higher prices being asked for new orders of steel for the next few months will be strongly held.

The spectacular event has been the rise in prices of galvanized steel and iron pipe of \$6 and \$4 a ton, respectively, and in galvanized sheets of \$5, because of the exceptionally high price of spelter, zinc blende in Missouri having reached a record price. The wage question in some sheet and tin-plate plants is not yet settled, and meanwhile these mills are down, but with stocks on hand to take care of the demand for some time.

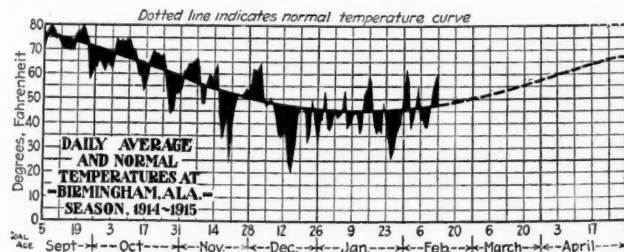
The pig-iron business has not enjoyed any large sales, but it is looking upward and not a little encouragement is taken among merchant furnaces in the decided improvement in machinery-building circles. The last few weeks has seen a growing demand for machinery independent of the larger buying attributable to the war account.—"The Iron Age."

SOUTHERN

BIRMINGHAM

Market on all grades quiet and heavy.

The market is quiet, with no change either way. The weather has turned much warmer, which will probably further curtail shipments of lump coal until the spring movement takes place. Blacksmith coal is normal, though the tonnage being moved may be slightly below normal.



LOUISVILLE

Warm weather curtails the domestic demand still further. Steam coals show some improvement but prices are irregular.

More abnormally warm weather has virtually suspended the domestic demand and accumulations are appearing at the mines and shipping points. The situation with the retailers has not improved and operators are dubious as to whether they can be induced to stock up again this spring.

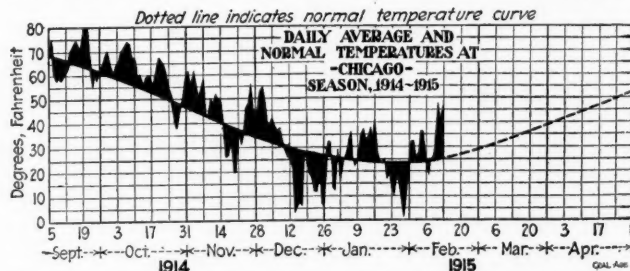
Steam coals are in better demand though not improving rapidly. Prices are irregular on all grades, running from \$1.50 on Eastern Kentucky block, down to almost the buyer's own figure. Egg coal is very hard to sell at from \$1 to \$1.25, while the best grades of nut and slack are bringing from 60 to 70c. and lower grades from 40 and 50c. down.

MIDDLE WESTERN

CHICAGO

Dullness prevails with weakness reflected everywhere. Adverse weather conditions continue. Screenings soft. Anthracite very quiet.

General market conditions show a further relapse due to the mild weather. Suspension of orders and cancellation of shipments have contributed toward a general demoralization. In steam coals there has been no recovery; screenings are softer, and the coarser sizes have seen but little demand, al-



though some inquiries have been received for steam-coal contracts covering next season's requirements, mainly from industrial plants. The recent slump was so abrupt that operators have not yet been able to reduce production in a corresponding ratio.

Reports of an industrial revival have benefited the steam-coal trade, but some of the best informed operators in Indiana and Illinois state with great positiveness that they see no improvement as yet. It is the consensus of opinion that general demand is weak and prices below normal. The steel industries are working very slow and the railroads are not taking the tonnage usual at this time. Sales are being made on basis of summer prices. Local buying from city retail yards is very light.

The Franklin County operators are maintaining prices by coöperative efforts on the part of a majority of the prominent companies in the district.

The movement from the Indiana mines for the current month has been less than in previous years. Domestic coals are sagging and prices generally show no recovery.

The market for Eastern Kentucky coals has been listless, though operators from that section are showing more interest in this market.

Hocking grades are fairly firm, mainly because production has decreased. Some coal was sold this week due to the accrual of demurrage, and in such cases \$1.35 was the minimum price.

Smokeless coals are not being bought to any extent. Most of the orders placed are at cut prices.

Splints are in bad shape, and all kinds of prices are being made.

The domestic demand for Springfield coals has been fair compared with other districts. Screenings are about the same as last week.

Anthracite sales are very slow, and few shipments are being made direct to this territory by the mines.

Prices are as follows:

	Franklin Co.	Springfield	Sullivan	Clinton	Cartersville
Lump.....	\$1.40@1.75	\$1.50	\$1.40@1.60	\$1.40@1.60	\$1.50@1.75
4-in. lump..	.....	1.10@1.15	.....	.....	1.15@1.25
Steam lump	.....	.....	.....	.....	.....
2½-in. lump.	.....	.....	1.25@1.35	.....	.....
1½-in. lump.	.....	.....	1.05@1.15	1.10	.....
Mine-run...	1.10@1.25	1.00@1.05	1.20@1.45	1.35@1.50	.....
Egg.....	1.30@1.75	1.35@1.50	.....	.....	1.50@1.60
No. 1 washed	.....	.....	.....	.....	1.50@1.60
No. 2 washed	.....	1.40@1.50	.....	.....	1.40@1.60
6x3-in. egg.	.....	1.25@1.35	1.25@1.35	1.15@1.35	1.25@1.35
Nut.....	.....	.....	.....	.....	.....
No. 1 nut...	1.30@1.75	.....	.....	.....	.....
No. 2 nut...	1.30@1.50	.....	.....	.....	.....
Screenings..	0.60@0.80	0.55@0.65	0.70@0.80	0.70@0.80	0.55@0.70

	Harrisburg	E. Kentucky	N. Riv. & Poca.	Somerset	Hocking
Lump.....	\$1.35@1.75	.....	.....	.....
1½-in. lump.	\$1.35@1.60
Lump & egg	\$1.75@2.00	\$1.50@2.00	.....
Mine-run...	1.05@1.25	1.10@1.25	.....
Egg.....	1.25@1.60	.....	.....	.....
No. 1 nut...
No. 2 nut...
Screenings..

Knox and Greene County 5-in. lump, \$1.40@1.60; 3-in. lump, \$1.35; 5-in. egg, \$1.30 to \$1.40; 3-in. egg, \$1.20 to \$1.30; mine-run, \$1.05 to \$1.10; screenings, 75 to 85c.

ST. LOUIS

Summer prices quoted on domestic sizes and some of the high-grade operations have been forced to suspend. Outlook discouraging.

Summer prices were being quoted the past week on domestic sizes, and even with a dropping off of this business, the steam market also went down. Colder weather has stimulated the market to a very small extent, but it is not likely that prices will advance above the cost of production. For the first time this winter some of the better mines in the Williamson-Franklin County field have been obliged to suspend operations on account of no orders.

The washed market has weakened some, and every field has felt the results of the warm period. Anthracite is coming in very slowly, with little demand; for the first time in several months there has been a fairly good demand for smokeless, which was readily taken care of by diverting coal from other markets where there was a surplus. The local situation is not at all encouraging, unless something unexpected develops.

INDIANAPOLIS

Moderate weather follows the prolonged cold spell. Coal demand slackens and mines on about half-time. Operators wait anxiously for the spring revival.

Mining conditions in Indiana show little or no change. The moderating weather is against activity and the mines are making about three days a week. Operators are watching the industrial situation, but its improvement is so slow that it has not yet affected the coal situation. Prices continue unchanged and about on a level with those at the opening of the season. For a short period, advances of 10 to 20c. were obtainable at some of the mines but others seemed glad to be able to operate at the summer price schedule. The hope of the trade now lies in a betterment of factory conditions, with the end of winter. The chief constructive factor of the week has been the reopening of the rail mills at Gary, Ind., after three months' idleness, giving employment to 4500 men.

KANSAS CITY

Coal trade brisker, but prices remain steady.

Kansas City coal trade has experienced a seasonable activity the past few weeks, and retail dealers have disposed of much of the surplus accumulation but are not purchasing heavily due to the nearness of spring. The warm weather has not been seriously deterrent to the coal trade, since Kansas City expects some of the heaviest winter after these spells.

PRODUCTION AND TRANSPORTATION STATISTICS

NORFOLK & WESTERN RY.

The following is a statement of coal handled by the N. & W. Ry. during January and the past four months in short tons:

	October	November	December	January
Pocahontas Field.....	1,021,699	837,577	798,182	912,682
Tug River District.....	270,651	253,975	227,944	298,766
Thacker District.....	264,528	235,080	227,938	257,580
Kenova District.....	112,455	90,772	90,030	98,422
Clinch Valley District....	84,530	237,831	135,362	169,581
Other N. & W. Territory	4,860	3,849	1,686	3,769
Total N. & W. Fields..	1,758,723	1,659,084	1,481,142	1,740,800
Williamson & Pond Creek	.....	.....	.....	.....
R.R.....	70,338	62,505	62,271	58,296
All other railroads.....	168,778	131,269	97,752	87,842
Grand total.....	1,997,839	1,852,858	1,641,165	1,886,938

CHESAPEAKE & OHIO RY.

The following is a comparative statement of the coal and coke traffic from the New River, Kanawha and Kentucky districts for December and the six months of the fiscal years 1913 and 1914, in short tons:

Destination	1914	December %	1913 %	1914	Six Months %	1913 %
Tidewater.....	187,931	13	301,113	21	1,797,457	16
East.....	227,978	15	224,684	16	1,280,469	12
West.....	1,040,097	69	849,714	59	7,325,153	67
Total.....	1,456,006		1,375,511		10,403,079	
From Connections						
Bituminous....	45,080	3	62,856	4	588,433	5
Anthracite.....	1,082		681		8,835	
Total.....	1,502,168	100	1,439,048	100	11,000,347	100
Coke.....	11,207		33,079		90,877	
					180,997	

FOREIGN MARKETS

ENGLAND

Situation much disturbed by difficulties due to the war. Prices are generally high and labor troubles are developing.

Feb. 5.—The coal industry remains in a disturbed condition owing to a variety of causes, most of which are traceable to the war directly or indirectly. The signs of labor unrest which are now making their appearance in various directions are adding to the anxieties of the trade, and although it seems probable that the West Yorkshire dispute will be settled before the notices expire on Feb. 20, other questions are now under discussion and complaints are rife that the miners who remain at work are not doing their best to meet the exigencies of the situation. Generally speaking, the demand still exceeds the supply, with the result that prices are very high and still on the up-grade, except in some sections of the export trade where high freights and scarcity of tonnage depress the markets. More shipping seems to be available now, however, and coasting, if not foreign, rates are easier, so that the question of seaborne transport is not quite so acute as it was, but railway congestion is still unrelieved, the consequence being that some markets at a distance from the centers of production, such as London, are comparatively short of supplies.—"Iron and Coal Trades Review," London, England.

Feb. 5.—Firmness is in evidence in all branches of the trade. New business is not active owing to the difficulty of arranging prompt supplies, sellers being heavily booked. The question of labor is becoming more serious. Quotations are approximately as follows:

Best Welsh steam.....	\$4.92@5.04	Best Monmouthshires...	\$4.33@4.44
Best seconds.....	4.56@4.80	Seconds.....	4.32@4.38
Seconds.....	4.50@4.62	Best Cardiff smalls.....	3.60@3.72
Best dry coals.....	4.56@4.68	Cargo smalls.....	3.12@3.36

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f.o.b. Newport, both net, exclusive of wharfage.

Freights—Chartering is on quiet lines owing to difficulty in arranging loading turns.

Gibraltar.....	\$5.52	Naples.....	\$7.32	Las Palmas.....	\$5.04
Malta.....	6.00	Venice, Ancona... 9.60		St. Vincent.....	5.28
Marseille.....	5.79	Alexandria.....	7.20	Rio Janeiro.....	6.72
Algiers.....	6.17	Port Said.....	7.20	Monte Video.....	6.12
Genoa.....	7.32			River Plate.....	6.36

Note—These quotations are based on an exchange rate of one shilling equals 24 cents.

Coal Contracts Pending

Contracts listed in this department are authoritative in every respect except where the source of information is questionable, in which event it is noted. All contracts are listed promptly on receipt and only repeated when additional information becomes available or in the last issue previous to the day on which bids will be closed. Liberal remuneration will be paid for all legitimate notices of this kind sent in.

Contract No. 81—Philadelphia, Penn.—The bids on this contract (p. 275), which provides for furnishing and delivering 29,000 tons of bituminous coal to the floating plant employed in the Philadelphia Engineer District, were as follows:

Name of Bidder	Class 1	Class 2	Class 3	B.t.u.	Commercial
Empire Coal Mining Co.	\$3.19	\$2.68	\$2.85	14,275	Somerset Smokeless
W. H. Bradford	3.02	2.60	2.85	14,400	Victor Smokeless
Sterling Coal Co.	3.27	2.83	2.98	14,600	Powellton Lloydell
Dexter & Carpenter, Inc.	3.30	2.85	3.05	14,600	So. Fork Semi-Bit.
Commercial Coal Mining Co.	3.12	2.70	2.85	14,500	"Star" Miller vein
Coale & Co.	3.12	2.70	2.85	14,500	Georges Creek Tyson
The Consolidation Coal Co., Inc.	3.13	2.63	2.78	14,150	Pine Hill Tyson
B. Nicoll & Co.	3.23	2.79	2.94	14,500	Hutchinson Fairmont
Hutchinson Coal Co.	3.00	2.50	2.70	14,000	Gas Coal Pen Mar
Brothers Valley Coal Co.	2.97	2.47	2.97	14,000	"Bird"
Hite & Rafetto	3.05	2.70	2.70	14,000	Quemahoning Junata
Philadelphia Fuel Co.	2.99	2.54	2.69	14,000	Smokeless So. Fork
Rogers-Corr Coal Co.	3.07	2.64	2.84	14,400	Peerless No. 1
John Wills	3.24	2.74	2.89	14,400	

Vessels of Class 1, dredges "Delaware" and "Manhattan" and vessels of similar type; coal to be delivered and trimmed into bunkers while vessels are at anchor in midstream or moored alongside of a wharf in Philadelphia Harbor; approximate quantity of coal for this class of vessels, about 23,000 tons.

Vessels of Class 2, deck scows; coal to be delivered on board in carload lots alongside coal piers; approximate quantity of coal for this class of vessels about 4000 tons.

Vessels of Class 3, tugs "Vidette," "Camden" and "Philadelphia" and vessels of similar type; coal to be delivered into bunker holes of tugboats, etc., alongside coal piers; approximate quantity of coal for this class of vessels about 2000 tons.

Address Col. George A. Zinn, 815 Witherspoon Bldg., Philadelphia, Penn.

Contract No. 84—New York, N. Y.—The only bid received on this contract (p. 318), which provides for furnishing and delivering 75 tons of coal, was from Meyer-Denker Sinram Co., at \$6.75 per ton. Address Cont. Clk. Lamb, Room 1034, Dept. of Charities, Municipal Bldg., New York.

Contract No. 89—Washington, D. C.—The following bids were received on this contract (p. 318), which provides for furnishing 12,000 tons of navy standard coal at the Naval Coaling Depot, Portsmouth, N. H., and 5000 tons at the Naval Coaling Depot, Key West, Fla.:

Bidder	Delivery at—	
	Portsmouth	Key West
Pocahontas Fuel Co.	\$3.90	\$5.00
Castner, Curran & Bullitt	3.65	
Edward M. Alden Co.	3.60 ¹	5.09 ²
Berwind-White Coal Mining Co.		5.40 ³
Chesapeake & Ohio Coal Agency	3.90	
Consolidated Coal Co.	4.15 ¹	
Commercial Coal Co.	4.04	5.68
H. N. Hartwell & Son	3.79	
Dexter & Carpenter	3.97	5.42
Darrow Mann Co.	4.02	6.00
Maryland Coal & Coke Co.	3.79	5.80 ³
Northern Coal Co.	3.88	
New England Coal & Coke Co.	3.92	
Smokeless Fuel Co.		5.09
C. H. Sprague & Co.	3.88	3.90
Willard Bros.	4.10	
T. H. Weaver & Co.	3.90	

¹For 6000 tons. ²For 1200 tons. ³For 5000 tons.

Archibald McNeil & Son Co., George's Creek coal, Portsmouth, \$3.80; Key West, \$4.90; New River coal, Portsmouth, \$3.95; Key West, \$5.07. Willett Martin Co., Portsmouth, Lincoln, Nantyglo, Penn., \$3.63; Bethel, Holzapfel, Penn., \$3.58; Beaver, Beaverdale, Penn., \$3.63; Quemahoning, Ralphton, Penn., \$3.58; George's Creek, Md., \$3.73.

In most cases the bidders on this contract specified from which mines the coal was to be furnished. Address Paymaster-General of the Navy Samuel McGowan, Washington, D. C.

Contract No. 93—Jersey City, N. J.—Bids will be received until 10 a.m., Feb. 24, for furnishing and delivering 2500 gross tons of best quality pea coal at the power house (p. 318). Address, Clk. of the Bd., John C. Sweeney, Boulevard Commissioners, County Court House, Jersey City, N. J.

Contract No. 94—New York, N. Y.—Sealed bids will be received until 10:30 a.m., Feb. 24, for furnishing and delivering bituminous coal for fire companies in the Boroughs of Bronx and Queens. Security required is 30% of the total bid and delivery is to be made as directed before Dec. 31, 1915. Address Fire Comr. Robert Adamson, Municipal Bldg., New York.

Contract No. 95—Baltimore, Md.—Oppenheim & Oberndorf, Hanover and Fayette St., Baltimore, will be in the market during April for a supply of standard mine-run soft coal. This company consumes about 200 tons per month. Address P. W. Tucker, Baltimore, Md.

Contract No. 96—Farmington, Mo.—The Municipal Electric Light & Water Plant, Farmington, will be in the market during April for about 200 tons of 1½ to 2-in. screenings. The usual contract price is \$1.90 f.o.b. railroad station, Farmington. Address Supt. C. M. Thomsen, Municipal Electric Light & Water Plant, Farmington.

Contract No. 97—Baltimore, Md.—The Merchants' & Miners' Transportation Co., Baltimore, will contract during April for an annual supply of about 240,000 tons of soft coal. Address Pur. Agt. and Gen. Mgr., W. P. Coria, Merchants' & Miners' Transportation Co., Baltimore.

Contract No. 98—New York, N. Y.—Sealed bids will be received until 10:30 a.m., Feb. 24, for furnishing and delivering anthracite coal as follows: No. 1—For the fire companies in the Borough of Queens, delivery to be completed before May 15, 1915; No. 2—for the fireboats, delivery to be completed before June 30, 1915; No. 3—for companies in Dist. No. 23, Borough of Brooklyn, delivery to be completed before June 30. In each case, the security required is 30% of the total bid. Address Fire Comr. Robert Adamson, Municipal Bldg., New York.

Contract No. 99—Baltimore, Md.—The Baltimore Bargain House, Baltimore and Liberty Sts., will be in the market about Apr. 1 for a supply of coal. This company commonly uses about 500 tons of Ralphton coal per month. Address Pur. Agt., G. E. Smith, Baltimore.

Contract No. 100—Galesburg, Ill.—The Galesburg Artificial Ice Co., Galesburg, will be in the market about Apr. 1 for 11,000 tons of 1½-in. screenings, the usual contracting price being \$1.50. Address W. R. Allensworth, Galesburg Artificial Ice Co., Galesburg, Ill.

Contract No. 101—Middletown, Conn.—The Connecticut Power Co., Middletown Division, will be in the market about Apr. 1 for 5000 tons of George's Creek Cumberland coal, the usual contract figure being \$4.40 per ton. Address Mgr. P. N. Golden, Connecticut Power Co., Middletown, Conn.

Contract No. 102—Baltimore, Md.—Strouse & Bro., Lombard & Paca St., Baltimore, will be in the market about Apr. 1 for from 300 to 400 tons of coal per month. Address Pur. Agt., George Nopper, Baltimore, Md.

Contract No. 103—Ottawa Ont., Can.—Bids will be received until 4 p.m., Mar. 1, for furnishing a supply of steam coal for the departmental dredges. R. C. Desrochers is Secretary of the Department of Public Works, Ottawa. Address Dist. Engr. John Sweeney, Winnipeg, Man., Can.

Contract No. 104—Baltimore, Md.—Sharpe & Dohme, of this city, will be in the market about the first of April for a supply of standard mine-run coal. This company uses from 250 to 300 tons per month.

Contract No. 105—Somerville, Mass.—The Board of Education will be in the market about Apr. 1 for 4000 tons of Cumberland and anthracite coal. The contract is made on a test

basis. Address the Commissioner of Public Buildings, City Hall, Somerville, Mass.

Contract No. 106—Knoxville, Iowa.—The Marion County Electric Co., Knoxville, will be in the market about Apr. 1 for 5400 tons of Iowa steam screenings, the usual contract figure being \$1.43 per ton. Address Marion County Electric Co., Knoxville, Iowa.

Contract No. 107—New York, N. Y.—The New York & Baltimore Transportation Co. purchase about 60,000 tons of soft coal per year. This contract will be let during April. Address Pur. Agt. B. R. Roome, Pier 10, East River, New York, N. Y.

Contract No. 108—Bay City, Mich.—The Bay City Electric Light Department will be in the market about Apr. 1 for 14,000 tons of slack coal, the usual contract price being \$2 per ton. Address Pur. Agt. E. E. Prohazka, Bay City Electric Light Dept., Bay City, Mich.

Contract No. 109—Indianapolis, Ind.—The Interstate Public Service Co. will be in the market about Apr. 1 for 7800 tons of No. 4 mine-run Indiana coal, the usual contract price being \$1.90 per ton, delivered. Address Supt. T. A. Elder, Interstate Public Service Co., 510 Board of Trade, Indianapolis, Ind.

Contract No. 110—Baltimore, Md.—The Maryland Biscuit Co., Baltimore, purchase about 1200 tons of bituminous coal per year. This company lets its contract during April. Address Pur. Agt. W. C. Scott, Maryland Biscuit Co., Baltimore, Md.

Contract No. 111—Watertown, N. Y.—The Board of Education will be in the market about Apr. 1 for 12,000 tons of best Scranton egg and stove coal. The usual contract price is \$6.40 per ton. Address Supt. of Schools, Frank S. Elsdale, City Hall, Watertown.

Contract No. 112—Baltimore, Md.—The Coca-Cola Co. will award a contract during the month of April for a supply of good grade steam coal. This company consumes about 100 tons per month, and deliveries are made in carload lots every eight or ten days. Address Pur. Agt. William Martien, 3 Calvert St., Baltimore, Md.

Contract No. 113—New London, Wis.—The Municipal Electric Light & Water Works Plant, New London, will be in the market about Apr. 1 for about 1200 tons of thin vein Youghiogeny lump coal. The usual contract figure is \$4.10, in bin. Address Supt. O. H. Prihnow, Municipal Electric Light & Water Works Plant, New London, Wis.

Contract No. 114—Baltimore, Md.—Wise Bros. will soon be in the market for a supply of standard grade mine-run coal, the present contract expiring in April. About 150 tons per month is generally used. Address Pur. Agt. and Supt., L. A. Hazzard, Wise Bros., Baltimore, Md.

Contract No. 115—Mount Pleasant, Iowa.—The Municipal Electric Light & Water Works, Mount Pleasant, will be in the market about Apr. 1 for 2000 tons of Illinois egg coal, the usual contract figure being \$2.70 per ton. Address Supt. T. W. McMillan, Municipal Electric Light & Water Works, Mount Pleasant, Iowa.

Contract No. 116—Baltimore, Md.—Stewart & Co., of this city, consume about 200 tons of Georges Creek coal per month. The present contract expires in April, and is awarded on a competitive basis. Bids are received by J. Middleton. Address Pur. Agt. Geo. R. Russell, Baltimore, Md.

Contract No. 117—Boston, Mass.—The Stone & Webster Co. will be in the market during April for 50,000 tons of New River and Pocahontas mine-run coal, deliveries to be made in proportionate amounts each month at Tidewater, Boston. Address R. E. Hamilton, 147 Milk St., Boston, Mass.

Contract No. 118—Baltimore, Md.—The Baltimore & Ohio Central Bldg. will be in the market about Apr. 1 for approximately 3000 tons of Somerset soft-grade coal. Address Pur. Agt. E. A. Foos, Baltimore & Ohio Central Bldg., Baltimore, Md.

Contract No. 119—New York, N. Y.—Bids will be received until 2 p.m., Feb. 26, for furnishing and delivering about 4,000,000 lb. of No. 2 buckwheat coal alongside of dock at the asphalt plant, 90th and 91st St., East River, Borough of Manhattan. The security required is 30% of the total bid, and a deposit of 1½% of the total amount must accompany each bid. The contract is to be completed before Dec. 31, 1915. Address Pres. Marcus M. Marks, 21st Floor, Municipal Bldg., New York.

Contract No. 120—Everett, Mass., and Providence, R. I.—The Stone & Webster Co. will be in the market during April for 79,500 tons of mine-run coal to be delivered as follows: 18,000 tons f.o.b. Everett, Mass.; 26,500 tons f.o.b. Providence, R. I., and 35,000 tons at Woonsocket. Address R. E. Hamilton, 147 Milk St., Boston, Mass.

Contract No. 121—Baltimore, Md.—The American Tobacco Co. purchases approximately 3000 tons of Orenda grade coal

per year. The present contract expires in April. Address Pur. Agt. J. A. Powell, care of the American Tobacco Co., Baltimore, Md.

Contract No. 122—St. John, N. B., Can.—Sealed tenders will be received until 4 p.m., Mar. 1, for furnishing coal for the Departmental Dredges for Nova Scotia and New Brunswick. Address Supt. of Dredges J. K. Blenkinsop, Dept. of Public Works, St. John, N. B., Can.

Contract No. 123—Baltimore, Md.—The G. B. S. Brewing Co. consumes about 10,000 tons of standard mine-run coal per year. The present contract expires in April. Address M. L. G. Fesenmeier, care of the G. B. S. Brewing Co., Baltimore, Md.

Contract No. 124—Yonkers, N. Y.—The Federal Sugar Refining Co., Yonkers, will be in the market about Apr. 1 for 60,000 tons of bituminous coal. Address Pur. Agt. P. Wooster, 91 Wall St., New York, N. Y.

Contract No. 125—Washington, D. C.—Telegraphic bids were requested by the Bureau of Supplies and Accounts, Navy Dept., until noon, Feb. 19, for either the transportation of coal or coal and transportation, for delivery at the Naval Coaling Depot, Boston, Mass., and Port Royal Disciplinary Barracks, Port Royal, S. C. The quantities desired were approximately 12,000 tons at Boston and 1000 tons at Port Royal, delivery to be as follows: At Boston, 6000 tons not later than Mar. 15, 1915, and 6000 tons not later than May 1, 1915; 1000 tons at Port Royal not later than Mar. 15, 1915. A daily discharge of 600 tons at Boston and 150 tons at Port Royal is guaranteed. Address Paymaster-General of the Navy Samuel McGowan, Washington, D. C.

Contract No. 126—Baltimore, Md.—The Chesapeake & Potomac Telephone Co. purchases about 900 tons of anthracite and bituminous coal per year. The present contract expires in April and bids for renewing the same will be received. Address Ch. Clk. William R. Nelson, care of Chesapeake & Potomac Telephone Co., Baltimore, Md.

Contract No. 127—Boston, Mass.—The Light, Heat & Power Corporation is in the market for 18,000 tons of bituminous steam mine-run coal, weekly deliveries to be made by rail at North Adams, Northampton and Leominster, beginning Apr. 1, 1915. Address H. L. Ogden, 77 Franklin St., Boston, Mass.

Contract No. 128—New York, N. Y.—The National Biscuit Co. will be in the market about Apr. 1 for 10,000 tons of No. 1 buckwheat coal. Address Pur. Agt. R. J. Pforr, 10th Ave. and 15th St., New York, N. Y.

Contract No. 129—Baltimore, Md.—The Equitable Bldg. consumes about 1200 tons of soft coal and will be in the market about Apr. 1 for such a supply. Address Pur. Agt. Franklin G. Lauderman, 663 Calvert Bldg., Baltimore, Md.

Contract No. 130—Lansing, Mich.—The Supply Committee, Board of Education, will call for bids about Apr. 1 for furnishing approximately 1700 tons of Pocahontas mine-run coal, the previous contract figure being \$3.73 per ton. Address the Clerk, Supply Committee, City Hall, Lansing, Mich.

Contract No. 131—Rochester, N. Y.—The Board of Education at this place will be in the market during the month of March for about 6000 tons of anthracite and 6000 tons of semi-bituminous coal. Address Secy. J. S. Mullen, Municipal Bldg., Rochester, N. Y.

Contract No. 132—Baltimore, Md.—The Continental Trust Co. will be in the market about Apr. 1 for from 1300 to 1500 tons of soft-grade coal. Address Pur. Agt. W. C. Casey, Continental Trust Co., Baltimore, Md.

Contract No. 133—St. Louis, Mo.—Bids will be received by the government engineers here until noon, Mar. 15, for furnishing 25,200 tons of coal in barges. Address Maj. Clarke S. Smith, Mississippi River Commission, International Life Bldg., St. Louis, Mo.

Contract No. 134—Cambridgeport, Mass.—The National Biscuit Co. at this place will be in the market about Apr. 1 for 1000 tons of bituminous coal. Address Pur. Agt. R. J. Pforr, 10th Ave. and 15th St., New York, N. Y.

Contract No. 135—Baltimore, Md.—Henry Sonneborn & Co., at this place, purchase an annual supply of from 3500 to 4000 tons of standard mine-run soft coal. In general the contract is let during March. Address Pur. Agt. A. Mainzer, Pratt and Paca St., Baltimore, Md.

Contract No. 136—Sandusky, Ohio.—Sealed bids will be received by the city government until noon, Mar. 1, for furnishing about 3000 tons of bituminous mine-run coal. Address Dir. of Pub. Ser. John J. Molter, Sandusky, Ohio.

Contract No. 137—Ellensburg, Wash.—Bids will be received up to 8 a.m., Mar. 1, for furnishing steam coal for Kittitas County at the following places: Heating plant at county jail, at Shoskins and Holmes Spur and at such places

in Ellensburg as required. Delivery is to be made in carload lots. Address County Audr. W. G. Damerow, Ellensburg, Wash.

Contract No. 138—Baltimore, Md.—The Calvert Bldg. contracts for an annual supply of 5000 tons of standard mine-run soft coal. This contract is usually let during March. Address Pur. Agt. Franklin G. Lauderman, Calvert Bldg., Baltimore, Md.

Contract No. 139—Orangeburg, N. Y.—The Rockland Light & Power Co. will receive bids until Feb. 21 for furnishing about 4500 gross tons of slack coal. Quotations should be f.o.b. cars, Orangeburg, via Erie or West Shore railroads, and deliveries are to be made in equal monthly consignments. Address Pur. Agt. F. P. Mooney, care of Charles H. Tenney & Co., 201 Devonshire St., Boston, Mass.

Contract No. 140—Hillburn, N. Y.—The Rockland Light & Power Co. will receive bids until Feb. 23 for furnishing 4000 gross tons of slack coal; quotations should be f.o.b. Hillburn, via Erie R.R., and deliveries are to be made in equal monthly consignments. Address F. P. Mooney, care of Charles H. Tenney & Co., 201 Devonshire St., Boston, Mass.

Contract No. 141—Boston, Mass.—Stone & Webster Co. is in the market for 50,000 tons of New River Pocahontas mine-run coal, deliveries to be made at Tidewater, Boston, in equal monthly proportions, beginning Apr. 1. Address R. E. Hamilton, 147 Milk St., Boston, Mass.

Contract No. 142—Poughkeepsie, N. Y.—Bids will be received until 10 a.m., Mar. 2, for furnishing one year's supply of anthracite coal for the Hudson River State Hospital. Specifications may be obtained on application. Address the Purchasing Committee, Capitol Bldg., Albany, N. Y.

Contract No. 143—Buffalo, N. Y.—Bids will be received until Mar. 3 for furnishing the annual supply of anthracite and bituminous coal for the schools and other public buildings of the city. Deliveries are to be made in such quantities and at such times as specified. Each bid must be accompanied by a check for 10% of the total bid, and bonds for 50% will be required. Address Comr. Francis G. Ward, Dept. of Public Works, Buffalo, N. Y.

Contract No. 144—Oswego, N. Y.—The Board of Education will be in the market during the latter part of March for about 600 tons of anthracite coal in egg, stove, nut and pea sizes. Address Chief Clerk, Dept. of Education, City Hall, Oswego, N. Y.

Contract No. 145—Malden, Mass.—Bids will be received until Feb. 23 for furnishing the Malden Electric Co. with 16,000 gross tons of mine-run coal and 16,000 gross tons of slack coal. Quotations should be made f.o.b. cars either at Mystic Wharf, Boston, or at Edgeworth, Mass., or by team at the plant, Malden, Mass., and deliveries are to be daily and in equal monthly proportions. Address Pur. Agt. F. P. Mooney, care of Charles H. Tenney & Co., Managers, 201 Devonshire St., Boston, Mass.

Contract No. 146—Haverhill, Mass.—Bids will be received until Feb. 23 for furnishing the Haverhill Electric Co. with 12,000 gross tons of mine-run and 12,000 gross tons of slack coal, delivery to be made alongside dock, Haverhill, as follows: 1200 tons on Apr. 1, May 1, June 1, July 1, Aug. 1, Sept. 1, Oct. 1, Oct. 15, Nov. 1 and Nov. 15. Address Pur. Agt. F. P. Mooney, care of Charles H. Tenney & Co., Managers, 201 Devonshire St., Boston.

Contract No. 147—Revere, Mass.—Bids will be received until Feb. 23 for furnishing 4500 gross tons of mine-run and 4500 gross tons of slack coal alongside Proctor's Wharf, Revere, for the Suburban Gas & Electric Co. Delivery is to be made at the rate of 1125 tons on Mar. 1, June 1, Sept. 1 and Nov. 1. Address Pur. Agt. F. P. Mooney, care of Charles H. Tenney & Co., Managers, 201 Devonshire St., Boston.

Contract No. 148—Fitchburg, Mass.—Bids will be received until Feb. 23 for furnishing 15,000 gross tons of mine-run and 15,000 gross tons of slack coal to the Fitchburg Gas & Electric Light Co. Quotations should be f.o.b. consignee's siding, N. Y., N. H. & H. R.R., Fitchburg. Deliveries are to be made in equal monthly shipments and consignee is to have the privilege of increasing this rate 100% during certain periods, and also suspending shipments during certain other periods, if necessary. Address Pur. Agt. F. P. Mooney, care of Charles H. Tenney & Co., Managers, 201 Devonshire St., Boston, Mass.

Contract No. 149—Montpelier, Vt.—Bids will be received until Feb. 23 for furnishing the Consolidated Lighting Co. with 6500 gross tons mine-run, or 2500 gross tons mine-run and 4500 tons of slack coal, delivery to be made alongside siding at Central Vermont Ry. The consignees are to have the privilege of increasing the rate 100% during certain periods and of suspending shipments during certain periods, if necessary. Address Pur. Agt. F. P. Mooney, care of Charles H. Tenney & Co., Managers, 201 Devonshire St., Boston, Mass.

CONTRACTS AWARDED

Contract No. 49—Harlan, Iowa—This contract (p. 231), which provides for furnishing about 2800 tons of coal to the Municipal Electric Light Plant of Harlan, has been awarded to the Colfax Consolidated Coal Co. of Colfax, Iowa, at \$1.10 per ton f.o.b. mines. Address Supt. C. D. Lutton, Municipal Electric Light Plant, Harlan, Iowa.

Contract No. 62—New York, N. Y.—This contract (pp. 189 and 275) which provides for furnishing and delivering coal, has been awarded as follows: Geo. D. Harris & Co. for 650 gross tons bituminous coal to the Far Rockaway disposal plant, Borough of Queens, \$2788.50; 100 tons of semibituminous coal to the Crematories of the Bureau of Street Cleaning at Far Rockaway, \$4.29; 180 tons of semibituminous coal to the Far Rockaway Aqueduct \$4.24 per ton. To Jurgen Rathjen Co. 280 gross tons pea coal to the Newton disposal plant, Borough of Queens, \$1307.60. To A. J. and J. J. McCollum 1040 gross tons of anthracite coal to the county and borough buildings, Borough of Queens, \$6523. Address Mr. Buckley, Borough Hall, Jackson Ave. and Fifth St., Long Island City, New York.

Contract No. 65—Columbus, Ohio—The bids on this contract (p. 231), which provides for furnishing coal to the various municipal departments, were as follows:

12,000 TONS for the municipal light plant. Hocking mine-run, General Hocking Fuel Co., \$1.67½; New River & Ohio Coal Co., \$1.85. West Virginia mine-run, General Hocking Fuel Co., \$1.69½; New River & Ohio Coal Co., \$1.59; Hisylvania Coal Co., \$1.72. Hocking nut, pea and slack, New River & Ohio Coal Co., \$1.35; Hocking Valley Products Co., \$1.20; Fletcher-Williams Coal Co., \$1.20. West Virginia nut, pea and slack, New River & Ohio Coal Co., \$1.39; Lorain Coal & Dock Co., \$1.49; Victoria Coal Co., \$1.54.

6000 TONS for the Scioto River Pumping Station. Hocking mine-run, General Hocking Fuel Co., \$1.62½; New River & Ohio Coal Co., \$1.85; Lorain Coal & Dock Co., \$1.59; Fletcher-Williams Coal Co., \$1.69½. West Virginia mine-run, General Hocking Fuel Co., \$1.69½; New River & Ohio Coal Co., \$1.59; Hisylvania Coal Co., \$1.72; Lorain Coal & Dock Co., \$1.61; New York Coal Co., \$1.59. Hocking nut, pea and slack, New River & Ohio Coal Co., \$1.35. West Virginia nut, pea and slack, New River & Ohio Coal Co., \$1.39.

2500 TONS for the Garbage Reduction Plant. Hocking mine-run, General Hocking Fuel Co., \$1.62½; New River & Ohio Coal Co., \$1.85; Hocking Valley Products Co., \$1.63. West Virginia mine-run, General Hocking Fuel Co., \$1.69½; E. A. Cole & Co., \$1.63; New River & Ohio Coal Co., \$1.59; Hisylvania Coal Co., \$1.72. Hocking nut, pea and slack, New River & Ohio Coal Co., \$1.35; Fletcher-Williams Coal Co., \$1.19½; Victoria Coal Co., \$1.29. West Virginia nut, pea and slack, New River & Ohio Coal Co., \$1.39; Lorain Coal & Dock Co., \$1.49; Victoria Coal Co., \$1.54. Kentucky nut, pea and slack, Victoria Coal Co., \$1.64.

380 TONS, delivered for other municipal departments, Hocking Valley Products Co., \$2.35; Fletcher-Williams Coal Co., \$2.30; M. A. Suydam & Co., \$2.34; John Wilhelm, \$2.30; The Franklin Builders Supply Co., \$2.32.

Awards were as follows: Fletcher-Williams Coal Co., 12,000 tons for the Municipal Light Plant, Hocking nut, pea and slack coal at \$1.20; 6000 tons for the water-works pumping station, Hocking nut, pea and slack at \$1.19½; 380 tons for the city hall, city prison and other city departments, Hocking lump at \$2.30. Victoria Coal Co., 2500 tons West Virginia mine-run at \$1.54 for the garbage-disposal plant.

Contract No. 73—Washington, D. C.—This contract (p. 318), which provides for furnishing and delivering bituminous coal either at Washington, D. C., or at Alexandria, Va., has been awarded to W. A. Smoot & Co., Alexandria, Va., at \$3.69 per gross ton. Address Lieut.-Col. J. P. Houston, Depot Quartermaster, Washington, D. C.

CONTRACT NOTES

A careful census recently taken of the steam plants in St. Louis that buy screenings in carload lots revealed the fact that the tonnage of this coal used now, in comparison with former years, is considerably lower. There is approximately 5300 tons of Standard screenings used for steam purposes in St. Louis per day, and about 1000 tons of Carterville screenings, in carload lots. One industry in St. Louis, the breweries, uses about 2000 tons of assorted screenings per day, delivered by wagons. This constitutes the bulk of the screenings moving into St. Louis, and represents about 8500 tons per day.

The New England Coal & Coke Co. has been recently awarded a contract by Stone & Webster for furnishing 79,500 tons of mine-run coal, deliveries to be made as follows: 18,000 tons to Everett, 26,500 tons to Providence and 35,000 tons to Woonsocket. Address R. E. Hamilton, 147 Milk St., Boston, Mass.